Title: *"A critical examination of the legal implications of Artificial Intelligence (AI) based technologies in New Zealand workplaces."*

William Tumai – Student ID# 9419924

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Supervisor: Andelka Phillips, LEGALS 594X – Thesis (words: *51,025*)

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Foreword - Mihi

Teenei au e mihi atu ana kia koutou nga Kaiako, kaiawhina, moo nga waa tohotohu, korerorero, oo whakaaro motuhake, me oo taa koha awhina moo teenei Pepa mooku. Te hunga kua hingaatu ki tua i te arai Haere, atu koutou whakangaro atu, Moe mai ra. Otira, ka whakahonore atu i te Whanau aa Tuwhakairiora, ara ki too taatou nei Kiingi a Tuheitia Potatau Te Wherowhero te tua whitu, aa te Whare Kahui Ariki nui tonu, Rire rire hau, Paimarire.

Translation

My congratulations to all lecturers, staff alike for all your specialist educational thoughts assistance and gift of knowledge that I will forever treasure wherever the course may benefit me in life's journey. Those of my ancestors who have passed will not be forgotten, rest in peace
Mihi to Kingi Tuheitia and my Mother's people, Rire rire hau Paimarire

Kua oti taku Kaupapa oo te Pepa Maramarama Horihori nei. I dedicate my Thesis to my loving Mother. Mo taku Mama. William Tumai LLM Candidate – Te Whare Wananga o Waikato UOW 2020 – 2021.

Abstract

A wide range of technology includes artificial intelligence (AI). We focus on "predictive algorithms, which include machine learning algorithms. For much regulatory purpose, the overall concept of a "predictive algorithm" covers a useful subset of algorithms called the "AI" in the recent public discourse. The thesis fulfills the purpose of the study to explore the expectations of current leaders as the leadership position changes as AI is implemented at work. The thesis will deepen AI's understanding of the impact of AI on future leadership by addressing these hypotheses. This thesis study employed a qualitative approach, and data from hypothetically model based but related approaches, use and examples to interview study structures of employees, such as architecture students and leaders in a technology organisation, were the demographic targets for detailed answers based on the questionnaire. This judgment explains that qualitative research makes it possible for people to understand patterns and phenomena by words instead of numbers. The benefits presented and the concerns posed by government predictive algorithms are important to take into account. It is also important, however, not to compare them with perfect decision-makers in human beings. There are a number of concerns and opportunities with the ever-greater use and increasing power and complexity of these tools. In order that the proposals are developed, or the new predictive algorithms are procured, New Zealand agencies must take or develop internal processes.

Keywords: *Artificial Intelligence Regulation, Workplace, New Zealand, AI Governance, Legal Impact, Japan AI, Algorithms.*

CHAPTER 01:

INTRODUCTION:

1.1. Research Introduction:

The chapter is a brief introduction to the subject discussed in this study. The introduction begins with a research history, then moves on to a research problem and goals, including the questions that the analysis would attempt to address in its conclusion. Before concluding with concepts applicable to the investigation, the introductory chapter discusses limitations. We aim to talk about the legal consequences of (AI) Artificial Intelligence-based technology in the workplace in New Zealand. From a legal standpoint, one of the most critical tasks is identifying the intended goal of regulation. Of course, current laws or systems with a broader scope may be considered to be sufficient. If this is not the case, a more specific description of the technology in question would have to be given. More precise meanings of what it means to construct knowledge have emerged in recent years. A system's ability to adapt and adapt in a new context, generalise its experience, and apply it to unknown situations is linked to intelligence[1].

Artificial intelligence (AI) is a broad field of computer science that focuses on creating intelligent machines that can perform tasks that would typically require human intelligence. While AI is a multidisciplinary science with many methods, advances in machine learning techniques are causing a paradigm shift in nearly every tech industry field. Rather than having a strict rule to restrict artificial intelligence (AI) algorithms, the New Zealand government aims to gradually incorporate AI restrictions into current laws and legislation as they are revised and

[1] Istok Fister and Istok Fister, Adaptation And Hybridisation In Computational Intelligence [Place of publication not identified]: Springer, 2015.

modified. An increasing consensus is emerging in New Zealand and worldwide that the time is right for work into the social, ethical, and legal implications of artificial intelligence[2].

This research's key central focus question is to discover how the legal impacts of AI technology as regards "work" would affect New Zealand and abroad, and what lessons might society better comprehend, understand, and learn how jurisdictional legal frameworks affect AI technologies?

The concept "Artificial Intelligence" is famously difficult to describe, encompassing everything from data science to machine learning to conversational interfaces, as well as debates about whether AI could eliminate jobs and contribute to science fiction scenarios. In a situation where a definition is required, the degree to which the definitional parameters must be specified must be considered. After all, courts must understand how to apply new laws, regulators must understand the scope of their authority, and stakeholders must foresee how and to whom the rules will apply. It would be critical to know the algorithms reach if a new legal regulation, regulatory body, or code of practice were to be developed in response to "AI algorithms" in government. WEF sees New Zealand as a perfect test ground for this agile thinking because of its limited size," the spokesperson said. "We have a tiny, stable democracy with a quick-moving government. Internally, through our government and broader society, we are well-connected, and we have good international partnerships. We are regarded as a digitally advanced country. The project team has created a draught roadmap for legislators to help shape their thinking regarding AI regulation. A section on tools and methods is included in this roadmap, which suggests policymakers consider various soft and hard policy measures and lever[3]. Under the New Zealand

[2] Alexander Artikis and Marek Sergot, Logic Programs, Norms And Action Heidelberg: Springer, 2012.
[3] Christopher Tong and D Sriram, Artificial Intelligence In Engineering Design Saint Louis: Elsevier Science, 2012.

government, efforts are being made to find options for regulating government algorithms. While the New Zealand government performs this work, it will serve as a case study for the project since it will test the high-level roadmap elements. Since the roadmap's inception, collaboration with the global community has streamlined the scoping, and the focus has shifted from the high-level roadmap to evidence gathering and tool growth. The project team's group workshops suggested that the creative methods and tools should focus on national discussions about AI ethics and principles, evaluation, and possibilities for a center of excellence[4].

What position does a legal system primarily based on a 20th-century business environment play in the future? What is already clear and confident is that new technologies will have a fundamental effect on the global labour market over the next few years. Not only on manufacturing employment but also on the center of human tasks in the service industry that is currently considered "untouchable." Economic systems, working relationships, role profiles, and long-standing work time and remuneration structures will change dramatically. AI-driven robotics advancements are an undeniable step forward in several industries, as they execute human functions more accurately, effectively, and efficiently[5].

Furthermore, they allow for exploring hazardous locations such as the ocean's depths and space areas that humans are unable to access due to physical limitations. However, rapid technological developments and rapid advances in robotics have raised fears among employees of all specialties about the possible threat to their employment. By 2025, it is estimated that robots will take over up to one-third of today's workers. This article delves into the overall

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[4] Ibid

[5] Sylwia Wojtcsak, "Endowing Artificial Intelligence With Legal Subjectivity", AI & SOCIETY, 2021, doi:10.1007/s00146-021-01147-7.

relationship between AI and robotics, looks at the improvements that AI-enhanced robotics is increasingly bringing to the business world, and considers the consequences of those staff changes.

1.1 Defining Terms:

Artificial Intelligence (AI):

Artificial intelligence is a branch of science that helps machines solve complex problems and cope with confusion in a human-like way, which entails giving machines human characteristics like intelligence and learning. AI also incorporates advances in math, neuroscience, cognitive science, chemistry, ethics, and ethics into the computer science approach to machine design for these purposes[6].

This word (AI) encompasses a wide range of capabilities, and there are several different perspectives on what intelligent robots are capable of. The four dimensions used in this study to characterise various types of AI are whether the AI is meant to pretend or act and whether it is supposed to think or act as humanly or rationally as possible. Solid and weak AI are two other AI concepts that have different goals. Weak AI is described as intelligent machines that act human-like but have pre-programmed responses. On the other hand, strong AI refers to structures that use connections and clustering in the same way that the human brain does, with reactions that are unpredictable because they are not predetermined. AI is also defined as having the ability to adapt to changing circumstances. According to another analysis, AI is characterised as "the

[6] Istok Fister and Istok Fister, *Adaptation And Hybridisation In Computational Intelligence* [Place of publication not identified]: Springer, 2015.

capacity of a machine to imitate intelligent human behavior." Simultaneously, the Oxford Living Dictionaries describes it as "the theory and development of computer systems capable of performing tasks support and legitimacy human intelligence, including such sensory acuity, speech recognition, decision making, and language translation."

According to the definitions given above, AI refers to intelligence equivalent to human intelligence, capable of performing human tasks and adapting to or interacting with the environment. People can have differing views about what AI is, as shown by the previous definitions. This research investigates the aspirations of leaders and their subjective perceptions of AI. As a consequence, the meanings of AI among the leaders are likely to vary. The aim is not to provide a description of AI but to investigate how leaders think about the term and what it means for the future of leadership[7].

Contemporary Issues of AI:

There are a few relevant current problems in AI and law that are worth mentioning. While a more thorough treatment is beyond this paper's reach, it is critical to bring them to the reader's attention. One of the most pressing contemporary concerns is the possibility of bias in algorithmic decision-making. It is essential to establish if the underlying computer models support women fairly and equally whether government leaders are using computer vision or other AI models to make crucial decisions that affect people's lives or liberties, such as criminal sentencing. Several critics have suggested that computer models that learn data patterns may be unconsciously biased towards some groups due to prejudices in the data. Consider software that uses technology to predict the likelihood of re-offending and bases its predictive model on

[7] William Hsu and Anne C. Hoyt, "Using Time As A Measure Of Impact For AI Systems: Implications In Breast Screening", *Radiology: Artificial Intelligence* 1, no. 4 (2019): e190107, doi:10.1148/ryai.2019190107.

previous police arrest records. Consider the possibility that police action in a given area is biased; for example, the police could arrest ethnic minorities at a slightly faster rate than non-minorities for the same offense. If this is the case, the discriminatory police conduct would be inadvertently reported in the police arrest records. As a result, any device system that discovers patterns from this data will subtly encode these prejudices[8].

Another current problem involving AI and the law is the networks generally of AI systems and the transparency of how AI systems make decisions. Frequently, AI systems are constructed so that even the programmers who developed them are unable to decipher the underlying mechanism. Various critics have expressed concerns that AI decision-making processes should be observable, interpretable, or at the very least transparent. Others also proposed that the systems be allowed to provide automated explanations for why they arrived at their conclusions[9].

Finally, as AI becomes more entrenched in government administration, there will be concerns of deference to automated computerised decision-making. There is concern that AI-enhanced automated judgments will appear to be more neutral, impartial, and reliable than they are. Suppose a judge receives an automatic report indicating that a convict has an 85% probability of re-offending based on a machine-learning model. In that case, the forecast has the appearance of mechanical omnipotence and neutrality. Judges which wrongly defer to this false precision, failing to consider the model's limitations, the complexities involved, the subjective

[8] Younghoa Son, "Legal Issues In The Artificial Intelligence(AI) Era", Journal Of Law And Politics Research 16, no. 4 (2016): 305-329, doi:10.17926/kaolp.2016.16.4.305.

[9] Abhedya Saini, "Artificial Intelligence A Threat", IAES International Journal Of Artificial Intelligence (IJ-AI) 5, no. 3

judgments that went into the model's development, and the fact that even though the model is correct, a criminal defendant is unlikely to re-offend two times out of ten[10].

Artificial Intelligence in Taxation- New Zealand:

AI may be used to promote social outcomes such as educating future tax policies to increase wealth distribution. It may help achieve better environmental results, such as accelerating efforts to make New Zealand pest-free and predicting the impact of climate change. The Subcommittee voted on the draught plan on Legal Affairs in February 2017. Universal Income and taxing robots' prospects were not voted into the final report due to fears that these recommendations might stifle innovation. Instead, the committee concentrated on new legal principles, a liability insurance system, and rules for self-driving vehicles. The EU's executive branch is currently considering these plans[11].

However, now that a new government is in place, AI seems to be a lower priority. The number of AI researchers in the United States is declining due to tax and immigration policies. Rather than following the Obama administration's advice and rising AI R&D support, the Trump administration is cutting AI research at the Science Foundation by 12%, to just $178 million. Using AI to boost its service delivery, the government is well placed to raise awareness and knowledge. This is a critical step toward bridging the current digital divide, affecting access to education and healthcare in particular. AI could aid in the delivery of better social results, the development of evidence-based policies, and government operations' productivity, all of which would be beneficial to taxpayers. The newly created position of Chief Technology Officer in

[10] Ella Brownlie, "Encoding Inequality: The Case For Greater Regulation Of Artificial Intelligence And Automated Decision Making In New Zealand", SSRN Electronic Journal, 2019, doi:10.2139/ssrn.3563887.

[11] Geoff Mulgan, "Artificial Intelligence And Collective Intelligence: The Emergence Of A New Field", AI & SOCIETY

New Zealand should champion AI use across the public sector and ensure a structured cross-agency strategy, leveraging the DIA's Service Innovation Team's forward-thinking work in particular[12].

Technological Unemployment & Law:

Technological unemployment is a form of systemic unemployment caused by the automation of jobs. Of course, fear of mass technological unemployment is not a new phenomenon, but it has recently gained traction in public discourse, various public policy environments, and academic studies. This anxiety stems mainly from the advancement of artificial intelligence, which seeks to replace humans in different high-skilled, high-status jobs. AI recruiting processes have the disturbing ability to encrypt and possibly amplify existing prejudices toward traditionally marginalised groups. Correcting discrimination and protecting employment takes time and effort, and sometimes a metric must be discarded entirely. Such processes must be thoroughly scrutinised and audited to determine unequal effects, determining who is employed and who is not, and why[13].

Currently, employment law in New Zealand depends on an augmented product between duplication and dry periods. Compared to an employee who another employee replaces, an employee whose position becomes truly superfluous may only rely on minimal legal rights subject to contractual obligations or collective agreements. Employment law has had no trouble categorising workers replaced by mechanisation as falling into the first category. Still, as AI technology begins to assume instead of displacing previously human positions, concerns arise as to whether this is the proper understanding of what is happening. It's one thing to see a human

[13] Kenji Susuki, "AI: A New Open Access Journal For Artificial Intelligence", AI 1, no. 2 (2020): 141-142, doi:10.3390/ai1020007.

worker replaced by a computer, but when law firms advertise that they're hiring "AI lawyers,"31, we have to wonder if that assumption is correct.

1.2. Research Background:

For decades, a further sample using a database of available information was taken using mathematical techniques. The first to use it seriously was the insurance industry. The Lloyd's Registry was created in 1688, and the potential risk of shipping projects is also a well-known early example. The first company to use 'actuarial' approaches to the estimation of life expectancy was Equitable Life in 1762. The first policy forecasts were developed around this time. In the 1740s, for instance, a German philosopher used data from census records as a model for estimation of marriage age and marriage and, therefore, birth rates based on the availability of land in a given area. In order to determine their tax liabilities, governments have kept databases of their people since the beginning of time. These databases could have been reused for other government institutions, especially financial planning institutions, with the advancement of the science of predictive modeling. In the 1830s, the British Company employs its first official actuaries. In its current currency, the Naval Pension Worker was responsible for saving hundreds of pounds. Predictive models employed in government already reflected those used in the business at the time[14].

The concepts like "artificial intelligence" and "intelligent human behavior" are not well described. Artificial intelligence refers to computer processes that, if carried out by humans, would necessitate intelligence. Thus, the term "artificial intelligence" refers to the study of intelligent problem-solving behavior and the creation of intelligent computer systems. Artificial Intelligence refers to the intelligence exhibited by computers. In today's world, Artificial Intelligence has become very common. It is the simulation of human intelligence in computers that have been trained to learn and imitate human behavior. These machines can learn from their

[14] Christopher Tong and D Sriram, Artificial Intelligence In Engineering Design Saint Louis: Elsevier Science, 2012.

mistakes and conduct human-like tasks. Artificial intelligence (AI) can have a significant effect on our quality of life as it develops[15].

Artificial intelligence (AI) has the potential to increase efficiency and create innovative products and services. These innovations are already in use in industries like retail, engineering, and entertainment, and there is a lot of room for growth in areas like pharmaceuticals, health, and transportation. The United Kingdom is in an excellent position to take advantage of the opportunities that have arisen. It has a globally recognised capability in AI-related scientific areas, has nurtured clusters of groundbreaking start-ups, and benefits from an open data-friendly policy setting. With this opportunity comes new public and policy discussions about automation and the future of jobs and concerns about the effect of AI technology on work and working life. There are already signs that such questions have entered the public consciousness, with the British Social Attitudes 2018 survey revealing that 9% of respondents believe "it is likely that machines or computer programs would do many of the jobs currently done by humans in 10 years." The Royal Society's public dialogues are highlighting "replacement" as one area of concern about crypto currencies[16].

Technology is changing in a broad sense today, and humanity is now living in the second machine era. Artificial Intelligence is used by people in their daily lives, not only by high-tech firms. The computer will now have the same impact on society as the steam locomotive did during the early machine era. The dream of creating logical, intelligent robots has already captivated humanity. People have worked on improving the design and functionality of primitive mechanical assistants since the Industrial Age. Though machine ethics and artificial agents'

[15] Ibid

[16] Geoff Mulgan, "Artificial Intelligence And Collective Intelligence: The Emergence Of A New Field", AI & SOCIETY 33, no. 4 (2018): 631-632, doi:10.1007/s00146-018-0861-5.

morality remain unclear in this field of technological advancement, the application of artificial intelligence (AI) in robotics has greatly aided the industry. The need for strong digital frameworks that can be used in the public sector is described in the plan for a Digital Public Service. For example, defining suitable policy and regulatory criteria for emerging technologies like AI is one example. This will ensure that emerging innovations are implemented in a legal, dramatic, and public-friendly manner. Our digital solidly ensures that human rights that apply offline are acknowledged and secured in the digital world, according to the strategy. The aim of AI and robotics has always been the same: to design and construct intelligent agents that can perceive, reason about, and act in the real world. As a result, today's robots can perform according to the strategy, our complex multi-step activities and operating under computer control without the need for human interaction. Intelligence has aided modern robotics advances. It has enhanced the robots' spatial awareness and reasoning, route planning, coping with ambiguity, and adherence to complex human orders[17].

Simply put, AI allows machines to learn from their past experiences, which are currently applied in industrial practice through probabilistic modeling. The latter has been one of the most widely used practical and theoretical approaches to creating machines that can learn from experience. Dealing with ambiguity, which is the most challenging task in machine learning, has also been made possible by the probabilistic method.

Artificial intelligence, or "AI," is a broad term that refers to several technologies. We concentrate on "predictive algorithms," a comprehensive list that includes machine learning techniques. The general definition of a "predictive algorithm" is helpful for various regulatory

[17] William Hsu and Anne C. Hoyt, "Using Time As A Measure Of Impact For AI Systems: Implications In Breast Screening", Radiology: Artificial Intelligence 1, no. 4 (2019): e190107, doi:10.1148/ryai.2019190107.

and oversight purposes, and it encompasses a valuable variant of the algorithms dubbed "AI" in recent public discourse. Accuracy, human command, transparency, bias, and privacy are the main issues surrounding the use of learning analytics in the public sector[18].

Accuracy:

The accuracy of the statistical models used in government should be subject to objective and public scrutiny. This is critical knowledge, but it is not readily or systematically accessible.

Human Control:

It is easy to see why solutions like requiring a "person in the loop" are appealing. However, if we do not approach them carefully, such assurances might end up serving as regulatory placebos. The addition of a human element to an automated process may hurt the system's accuracy in some cases.

Nonetheless, a person in the loop can be helpful in circumstances where automated systems are not stable enough to be left alone, where variables that are not easily automatable must be considered, or where discretion is desired for whatever purpose. If a general right to human interaction is deemed to be beneficial, it should be supplemented by a "right to know" that online analysis is being used.

In the public sector, where legislative powers cannot be transferred or fettered before parliamentary approval, a legal barrier to automated decisions can arise. Statutory authorities who use algorithmic tools as decision aids must be wary of delegating too much power to the

tool or otherwise limiting their discretion due to automation complacency and prejudice (Suzuki, 2020).

Transparency to Explanations:

New Zealand legislation already gives people the right to know why government agencies make decisions, mainly under section 23 of the Official Information Act. This is reinforced by the judicial authority, which states that specific explanations must be clear to a review body, anyone with a vested interest in the decision, and, in some cases, the general public. Predictive methods used by the government must promote meaningful conclusions where individuals impacted have a right to one. When the system's workings are fundamentally complex, this entails supplementing it with an "explanation system" that generates understandable interpretations. The algorithms used by predictive policy models must be publicly inspectable, regardless of their commonsense explainability. To ensure that agencies can meet this requirement, regulations should be put in place to ensure that algorithms are either produced in-house or purchased on terms that allow for inspection, ensuring that neither the form nor the terms of sale prevent or hinder information algorithm from being made publicly accessible[19].

Discrimination and Fairness:

In a predictive method, "fairness" can be described in a variety of ways. It might be challenging to meet all of the meanings at the same time. The types of fairness applicable to the circumstances in which government agencies use particular algorithms should be considered. Excluding protected classes from test examples or input parameters does not guarantee that the

findings would be equal or discriminatory. Other variables, for example, may serve as close substitutes for protected features, and even relatively harmless input data may be contaminated by historical[20].

Privacy:

We suggest that more precise criteria to define the intent of gathering personal information be given effect in the realm of privacy and security law. New Zealand should also consider enacting a right to fair inferences, as well as improved re-identification, de-identification, unauthorised disclosure, and the right to be forgotten rights.

There are several general approaches to AI control. One includes the use of so-called "hard" regulation, such as legislation as interpreted and enforced by court decisions; some involve self-regulatory models—a third consists of some sort of regulatory agency. In New Zealand law, there are several legal provisions for precision, anonymity, openness, and freedom from discrimination, all of which are likely to play essential roles in the field of predictive algorithms. It is worth exploring whether these rights could be improved or fine-tuned to better adapt to technology. In this respect, foreign measures such as the European Union's General Data Protection should be monitored for comparison (Tong & Sriram, 2012).

Regulatory models that focus on individuals affected enforcing legal rights, though necessary, are unlikely to be sufficient in addressing the concerns about the increasing use of algorithms. Affected people often lack the expertise or ability to keep these systems and techniques accountable adequately. They are also unlikely to have the broad perspective needed to assess their impact across communities. Unless the benefits of predictive algorithms are to be

maximised and their risks avoided or minimised, some kind of "top-down" scrutiny, in addition to individual rights models, is likely to be needed. To that end, we have suggested the establishment of a separate regulatory agency. A new regulatory agency may take a variety of forms. Both of them have advantages and disadvantages. There are few foreign instances from which to learn at the moment, and those that occur are in their infancy[21].

If a regulatory agency is granted some hard-edged powers, the ability to regulate and maintain compliance with those powers must be considered. If the organisation is assigned the task of scrutinising algorithms, it must bear in mind that they are flexible resources that can be refashioned for various purposes. New utilises harms should be investigated, not just new algorithms. Our research was a first look at the severe problems that specific artificial intelligence can cause. These challenges pose challenges and vulnerabilities for New Zealand to bring different ways of learning about and interacting with these emerging technologies. To reduce these risks and optimise these opportunities, we emphasize the importance of consulting a wide range of stakeholders, including those who are most likely to be impacted by algorithmic decisions, such as Mori and Pacific Islanders[22].

1.3. Problem Statement:

The rise of AI in the workplace poses several obstacles for New Zealand, which must be addressed for businesses to reap the innovation's full benefits. Organisational leaders must respond to technological advancements and recognise potential challenges that can emerge as a

[21] Sylwia Wojtcsak, "Endowing Artificial Intelligence With Legal Subjectivity", AI & SOCIETY, 2021, doi:10.1007/s00146-021-01147-7.

[22] Younghoa Son, "Legal Issues In The Artificial Intelligence(AI) Era", Journal Of Law And Politics Research 16, no. 4 (2016): 305-329, doi:10.17926/kaolp.2016.16.4.305.

result of them and create incentives solutions to these issues and be able to see new opportunities to be future-ready. While the current literature on AI's legal ramifications in New Zealand suggests how the leadership position will shift, it's also essential to look at what leaders expect from the implications. Leaders can have helpful insight and expertise on the subject. As a result, leaders' observations into the area of expertise will help explain how AI can influence the leadership position in the current jobs. Artificial intelligence can significantly enhance our workplaces' productivity while also augmenting the work that humans can do. When AI takes over mundane or risky activities, it frees up the human workforce to focus on tasks that require imagination and empathy, among other things. Leaders' goals often reveal how well-prepared they are for potential consequences. A large gap between leaders' expectations and knowledge research may imply a lack of planning and foresight into the future, both of which are essential for leaders to keep up with technological advancement.

1.4. Objectives & Research Questions:

This study investigates current leaders' expectations for how the leadership position will evolve as AI is implemented in the workplace. The thesis will contribute to a deeper understanding of how AI can impact the future's leadership position by addressing these assumptions. Since leaders may have relevant experience, their priorities may provide insight into a field of expertise. Furthermore, the study results can be used to assess how well leaders are prepared for the changes that the future will bring. There is no excessive amount of study on the subject, even though studies on the subject are rapidly growing. However, the writers have mapped out the initial publications pertinent to the current state of the art. The sources mentioned in this subchapter do not make up the entirety of the literature review. Still, they were considered to be the most important and closest to the thesis's subject.

The object of this research is to address the following research question:

1. The legal impact on the nature of work on New Zealand Employees and relevant employment processes and how these considerations might lead to more efficient workplaces?
2. Are you shifting tax obligations from humans to computers (should the employment and use of computer-based software, technologies, and systems in New Zealand attract income tax obligations (legal personality of machines)?
3. A comparison of AI impacts on the workplaces of Japan. What lessons can New Zealand learn?

This study begins with a review of related literature and research in AI, technology, and legal consequences in New Zealand. Qualitative interview studies conducted by certain authors with leaders are conducted to gain a deeper understanding of the expected effects on the leadership position. Since they have valuable expertise and experience in leadership and technology in practice, they have leadership skills in the technology sector. The data is analysed and classified, and the results are then interpreted and evaluated using relevant literature to come up with a response to the research question.

1.5. Study Limitations:

It is critical to resolving the thesis's research limitations, as they represent its scope. The research topic focuses on the legal ramifications of (AI) Artificial Intelligence-based technology, limiting the data collected to New Zealand's future workplace expectations. The information gathered for this study reflects subjective perceptions that should not be confused with information about natural consequences. Assumptions can only be made because the future has

not yet occurred. Organisations may have difficulty predicting AI's effects on the potential leadership position since AI is not yet applied in every workplace.

Other research constraints include the restricted time allotted to complete the research and the difficulty of covering all aspects of a knowledge field in a single analysis. With more time, a more comprehensive range of interviewees might have been reached, allowing for a more accurate image of how leaders interpret AI's effect on leadership's future position. Because of the time constraints, a settlement of distributed questionnaires had to be made, primarily in the Lund field, which impacts the generalisability of the thesis results. Furthermore, AI and its legal ramifications are significant research subjects that are difficult to cover thoroughly. As a result, there are drawbacks to covering the issues in their entirety. The literature on AI and leadership in this study had to be condensed to fit into a thesis article's confines. The broader social implications that AI implementation would have been outside the reach of this study. The analysis would not look at how many but which jobs would be lost or generated due to AI implementation in the workplace. Aspects of this will not be investigated.[23]

1.6. Conclusion:

In this chapter one, we have discussed the aim of the study that is to discuss legal implications of AI Artificial Intelligence-based technologies in New Zealand workplaces in the research introduction, history, and the problem statement of organisations that must adapt to the development of technology and identify new challenges, find optimum solutions to these problems, and see new opportunities for the future. Then, research questions and objectives were chosen that would be further discussed incoming chapters 3, 4, and 5 with the help of different kinds of literature. The methodology would be described in chapter 02 of the thesis.

CHAPTER 02:

METHODOLOGY

2.1. Research Method - Introduction

This research will take a qualitative approach. This decision explains that qualitative research allows for the interpretation of patterns and people's comprehension of the phenomena by words rather than numbers. It is an appropriate method since it provides interviewees within key studies, and outside the realm of this thesis, to express their subjective thoughts and motives. As a result, qualitative analysis is a good match for this review. Qualitative research offers a tool that allows for the analysis and interpretation of complex data when exploring people's perceptions of AI's effects on the leadership position in the future workplace. Since these sources are deemed the most important in terms of the study's problem formulation and intent, the research presents a narrow literature section. The authors will make assumptions about the research questions' outcomes based on the theory[24].

2.2. Research Design:

In this study, the research design for gathering, measuring, and analysing data was chosen based on its ability to address the research question. Survey research, specifically interview studies, again outside the realm of this thesis due to time restrictions and COVID- 19 restrictions, was selected as the research technique for achieving the research objectives. Survey research is an excellent way to gather information about people's beliefs, awareness, and actions. The most compelling research approach for this study is survey research since the aim is to learn about leaders' expectations for how AI can affect their leadership roles in the future. Since the study

focuses on individual desires, some case study responses from each participant are treated as respective data sources, and the individual is the unit of research. Since the thesis investigates leaders' expectations for a potential case, researching individuals from different organisations rather than groups of leaders from the same organisation allows for a more excellent range of responses. It also assists in the prevention of prejudice engendered by corporate cultures[25].

Furthermore, due to this thesis's limited time frame, a comparison between classes of members from different companies is not sufficient. To collect data, case studies were conducted over four weeks, but only once for each leader. The data collection approach is appropriate for studies. The aim is to investigate individual participants' perceptions at a specific point in time, and it is not necessary to discover any shifts in interviewees' participant responses. This data collection technique, dubbed cross-sectional, is a good fit for this study's future research design.

2.3. Data Collection:

This thesis is a qualitative research existing literature study in which data will be gathered through semi-structured case studies, reading papers, and reviewing the literature on the research subject. The decision to research a literature review was made to collect the necessary information and data on the chosen field study. A literature review like this aims to summarise the current state of knowledge in the field of study. As a result, the study was able to define a 'void' in the area where further studies could be beneficial, resulting in this thesis's research topic[26].

[25] Ella Brownlie, "Encoding Inequality: The Case For Greater Regulation Of Artificial Intelligence And Automated Decision Making In New Zealand", SSRN Electronic Journal, 2019, doi:10.2139/ssrn.3563887.

[26] Younghoa Son, "Legal Issues In The Artificial Intelligence(AI) Era", Journal Of Law And Politics Research 16, no. 4 (2016): 305-329, doi:10.17926/kaolp.2016.16.4.305.

1. **Interview Structure (Case Studies) & Process:**

The following references to the phrase “Interview” “Interviewee” and “Interviews” denotes a commitment by the writer to engage in Interviews in future work and endeavours in A.I. as a subject. In this instance, and by way of reference, qualitative semi-structured interviews would have been used to collect data. Interviewing methods were chosen because it provides the researchers with a collection of interview questions to work with and a degree of versatility. The researchers should change the interview questions based on the interview's direction while maintaining the overall theme. For many factors, the interview style chosen was beneficial to the study. First, since the discussion was focused on a specific topic, some structure was required to keep the interview on track. Second, since the desired data are individual preferences, this study needed the flexibility to delve deeper into important topics to the people interviewed. These resources may be available via semi-structured interviews. Finally, since more than one person was interviewed, the researchers needed some framework to be the ability to paint conclusions from the data.[27] Again these are further future considerations to take into account for conducting Interviews in thesis studies on the subject of A.I.

Preparations were made before the interviews to ensure that the time spent was as productive as possible for both the writers and the interviewees. The authors read appropriate literature on the topic and write a literature review to acquire enough information to establish an adequate interview framework as part of their plan to prepare and perform good interviews. In keeping with the strategy, the questionnaire items were also made simple to understand and to the point. Furthermore, to the best of the authors' knowledge, the interviews were impartial to capture the respondent's expectations and avoid moving the participant's responses in a specific

[27] Geoff Mulgan, "Artificial Intelligence And Collective Intelligence: The Emergence Of A New Field", AI & SOCIETY 33, no. 4 (2018): 631-632, doi:10.1007/s00146-018-0861-5.

direction. With the parameters in mind, the interview began with an introduction and a discussion of the thesis topic before concluding at the scheduled time. The interview framework began with questions to be answered to create a comfortable environment before discussing the thesis's main topic[28].

There were 46 participating AI participants in New Zealand for the interview process, even those in academia, the software provider sector, consulting industries, and end-user organisations. The participants were asked to discuss their definitions of AI, prospects for AI in New Zealand, drivers and barriers of AI growth in New Zealand, and suggestions for improving AI adoption in New Zealand. After each interview question, the respondent was given as much time as possible to talk openly and without interruption. This is advantageous for preserving the versatility that a semi-structured interview can provide. If a respondent wanted to delve deeper into a subject, that was encouraged and analysed as part of the response. In line with the importance of critically examining interview responses, interview answers that were vague to the interviewing authors were followed up with additional questions or examples to help the authors better understand the complainant's expectations. Both authors were present for all interviewing, making it easier to perform the interview so multiple conductors will separate the job. As a result, the writers assisted one another in taking notes and observing their physical responses. As a result, the conductors asked specific follow-up questions and analysed respondents' actions and attitudes during the interviews, making it easier to interpret the collected data[29].

Because of the benefit of acquiring verbal signals from the participants, like body language, nervousness, or tension, most interviews were conducted face-to-face. Owing to the

[28] Ibid

[29] William Hsu and Anne C. Hoyt, "Using Time As A Measure Of Impact For AI Systems: Implications In Breast Screening", Radiology: Artificial Intelligence 1, no. 4 (2019): e190107, doi:10.1148/ryai.2019190107.

authors' and participants' geographical distances, a few interviews were conducted over the internet. To ensure the peaceful and undisturbed atmosphere that promotes, the location for the face-to-face interviews was selected to be close to the respondents' offices without any intrusion from other people, most usually in a conference room. The thesis authors decided to document and then decode the complainant's words into text while performing the interviews to improve discussions[30].

2. Sample Collection:

The target demographic must be identified to find the correct sample for the conducted interviews. Individuals in leadership roles linked to the technology industry, such as leaders with an architecture degree or leaders in a technology organisation, were the target demographic for this thesis. At a minimum, the leaders had to have one employee reporting to them and have a working knowledge of technology. The authors used a stratified random sampling technique to choose the participants for this analysis, which means the sample does not represent the entire population. Non-probability sampling was selected for this analysis because it has many advantages. It is a low-cost and simple method of obtaining knowledge. The authors were able to locate people to interview in their field. Second, nonprobability sampling has fewer conditions for obtaining a significant sample than probability sampling. A likelihood sample would have needed more participants, which was not feasible given the study's time frame (Wojtcsak, 2021).

Therefore, a probability sampling method was omitted from the data collection process, in line with the author's concerns about the adequacy of using sampling technique is a limited qualitative study. Purposive sampling was chosen as the form of non-probability sample for this analysis. Purposive sampling is dependent on the subjects' experience and skills in the field of

[30] Ibid

research. The writers chose individuals who were thought to have extensive expertise and insight into AI and leadership. Because of purpose sampling's value to reflect a diverse community of individuals, the interviews were conducted with leaders in various roles. CEOs, CTOs, IT directors, and managing directors from small start-ups, medium-sized businesses, and multinational corporations made up the organisations. As proposed by Glaser and Strauss, the authors used theoretical sampling to assess the number of attendees for the sampling. This meant that interviews were performed before trends emerged and the information collected from the various participants matched or did not provide any new information to the analysis.

2.4. Data Analysis:

Thematic analysis was used to analyse the data from the semi-structured interviews, which is described as categorising data into themes. Audio recordings of the complete interviews and meeting instructions during the interviews were used to analyse the results. The audiotapes are listened to and summarised. The summaries were made up of translated sentences and sentence shortenings that were particularly useful in answering the research query. The introductions and abstracts within each source have been examined first to evaluate better the extensive range of examples that have been gathered, taking into account the timeline of this thesis method. This was done to reduce the number of sources that were most appropriate for this analysis and contained the essential data for our research query. Each seed is carefully read after the sources were narrowed back to a tiny number. Each seed was reviewed twice, first against the data analysis criteria outlined below, and then either excluded or included in this thesis based on its content's importance to our research issue.

To avoid data misinterpretations, most of the articulated terms and sentences that were essential for answering research questions were transcribed rather than reformulated. The

summaries were read several times, along with the interviews' written notes, before being coded into text units that the writers categorised. The coding units included keywords and sentences, as suggested for data analysis, and themes, which assist in the discovery of popular expressions of ideas. The companies were grouped into categories that were inferred from the results. The authors went back to the texts many times during the calibration phase to fine-tune the types. This is a vital aspect of qualitative data analysis because it helps you better to understand the information, patterns, and connections. After that, the literature was used to describe the coding unit categories. In this sense, theory aided in explaining the results and provided a foundation for comprehending them. Finally, the authors analysed previous literature-based theory's accuracy to decide if the findings validated or contradicted the current approach[31].

2.5. Data Validity & Reliability:

Validity aims to demonstrate whether the study's measurements were accurate and a qualitative data collection that pervades the pursuit of good truth in the entire phase. The approach used is tailored to the needs of the project. The study's implementation and content were built on a solid foundation of papers and literature. Data collection regions are carefully calibrated to provide answers to essential questions to the study's intent. Internal and External data validity can be defined in two parts:

The internal validity of this thesis can be influenced by the research method used. Internal validity is characterised as the degree to which the research results accurately reflect the data. To begin, the data analysis approach is critical in determining the degree of internal validity. Internal validity is determined by the authors' ability to produce and present relevant categories for data analysis, which is defined as their ability to create and deliver relevant data

[31] Alexander Artikis and Marek Sergot, Logic Programs, Norms And Action Heidelberg: Springer, 2012.

analysis criteria. Inter-judge consistency, which is the level of stability in the analysed data between different coders, is also essential for internal validity. To achieve high category consistency, inter-judge reliability, and internal validity, the collected data should be correctly classified and evaluated in the same way as a result of who is analysing it. It's important to remember that data analysis is often skewed to a degree because humans do it. The authors have a predetermined understanding of the study subject based on the literature review and previous experience, and they are most likely to relate respondent's answers to these interpretations. Even if the current theory is needed to interpret the data, there is a possibility that the authors will ignore data that is not compatible with the literature[32].

As a result, both authors of the study obtained and interpreted the data following recommendations for avoiding biased data analysis. Furthermore, various data interpretation hypotheses were used to eliminate controversy and improve internal validity. Internal validity can be impacted by the use of interviews as a data collection tool. Because of the versatility that semi-structured interviews provide, there is a possibility that the interviewers will ask questions in a way that will influence the respondent's responses. Respondents can experience different interviewing conditions due to questions not being posed in the same way to each respondent.

This can have an impact on the study results.

Furthermore, respondents' responses could be influenced by the fact that they were conscious that their interviews were being registered. Respondents may lack the confidence to be truthful or misrepresent their responses to match the circumstances. The respondents in this study

[32] William Hsu and Anne C. Hoyt, "Using Time As A Measure Of Impact For AI Systems: Implications In Breast Screening", Radiology: Artificial Intelligence 1, no. 4 (2019): e190107, doi:10.1148/ryai.2019190107.

are anonymous to avoid this effect. The respondents were not told about the survey questions before the interviews to prevent the respondents' plans on their responses.

The methods used will affect the external validity, described as the degree of generalisation or applicability of the research findings to other contexts. A greater sample size or a contrast between groups of members from different companies would have improved the study's generalisability. However, due to time constraints, a smaller sample size was agreed upon. To enhance external validity, data was obtained from many managers in various roles from various organisations. Furthermore, there are disadvantages to using theoretical sampling to collect data. Since all swans seen so far have been white, it's difficult to know if all swans are white. The same is true for theoretical sampling: there are no anomalies in the data after many interviews do not mean that new data will not emerge after additional interviews. Nonetheless, due to the thesis's time constraints, data collection had to come to an end. In terms of the thesis subject, theoretical sampling was always the most effective method for data collection.

2.6. Result:

The data gathered during interviews are presented in the methodology's result segment. Respondents' existing mindsets and attitudes toward AI implementation in the workplace are also expressed, as these mindsets and attitudes parallel respondents' expectations for what the future workplace needs of New Zealand:

i. Do you think that the considerations of Artificial Intelligence will lead to more efficient workplaces?

The majority of respondents emphasized the value of an organisation's ability to adapt and evolve. Respondents said they were "open to suggestions about how AI can be used internally in

the business" and "willing to adapt and use any AI resources" at the moment. In terms of the future, many respondents reported that "as a leader, you will not survive if you do not adapt," "you must be able to consider how quickly things change," and that "you must learn how to manage the situation because innovation cannot be stopped Instead of being scared of the unknown, you should welcome it." Others said that "a leader must keep an open mind" and that as a leader, you must "always plan for change as everything changes all the time." "People still wonder whether AI will alter something," one respondent continued.

Several respondents saw the advancement of technology and artificial intelligence (AI) as an opportunity rather than a challenge to the potential leadership position. "I see technological advancement as a possibility," respondents said, and "AI should be a chance, so I am optimistic about using AI internally in the business." According to the same respondent, the problem with becoming afraid of AI is that "of course it causes tensions, so welfare and money will be reallocated." Some people wish to return to the ways of the past. As a result, emerging innovations have counterforces." One respondent claimed that he was "not scared of technological growth" because "it is not really about abilities that are challenged, it is about the willingness to adapt." Technology and artificial intelligence would have exciting opportunities." "Often, the issue is that people at the top do not know what young folks understand about digital technology and AI, and they do not appreciate what can be achieved," another respondent said. And all too often, they'll think it's all nonsense."[33]

Two respondents perceive AI as a new "trend" or "buss phrase" for which leaders must plan. "I plan by reading a lot, analysing patterns, attending conferences, and expand with AI services," one of the respondents said. "The best plan is not to have a plan, to be accessible about

[33] Ibid

all that comes," said the other respondent. This respondent believes that his organisation will be able to "either bring in something that could be replaced by AI in the future or use the power of AI and twist it to make it more special" in the future. Besides, one respondent highlighted the importance for a potential leader to "listen and absorb information...to stay current and still strive for the future." "Encouraging staff to extend their capacity to stop being trapped into just one strategy," said the same respondent.

ii. Would the process of AI Implementation in the workplace affect the jobs and tasks present in the organisation, both today and in the future?

Other than in their goods, most respondents said they do not use AI throughout the workplace today. "We do not use AI right because now we do not have the talent for it," one respondent explained. "It's costly to be the first ones to use AI," another respondent said. "Finished AI solutions did not appear in the market until the previous year," said the same respondent. As a result, the vast majority of respondents reported no current AI effect on their leadership positions. However, one respondent did use AI in a manner that affected his leadership position. He said he used AI in the form of "a robot which runs via redacted or anonymised data" to help him make decisions. Other innovations affect the leadership profession today, according to respondents. "The leadership position has not been influenced very much by AI internally in the organisation," one respondent said, "but because the whole IT-part has evolved, there are more assisting resources and technology for the leader that promote teamwork and minoring." "Already currently, there are comparatively inexpensive robots capable of performing routine tasks," one respondent clarified how businesses today use robots to promote work. "Technology has allowed us to reduce the number of workers from forty to twelve," said another respondent.

In conclusion, most respondents believe AI would eventually replace a variety of human tasks and occupations. Not only are routine tasks expected to be automated further, but AI is also likely to eliminate roles and functions currently performed by knowledge workers, potentially reducing the human workforce. Future leaders will be forced to lead a crew that includes both humans and artificial intelligence.

iii. Artificial Intelligence (AI) gives the importance of promoting creativity and teamwork in the future workplace.

When looking at the findings of how respondents felt about their current relationship with their workers, specific themes emerge, with respondents emphasising coaching and responsibility distribution. "My job is to help others grow and find new possibilities," one respondent said, describing his leadership as "servant leadership." He also emphasized the significance of being "in charge of the vision, plan, and decision-making." He went on to say that hierarchical leadership, in which one person tells others what to do, does not fit in today's workplace. Since all is moving so quickly these days, he believes the emphasis should be on recognising groups' tasks rather than individually. Another respondent took it a step further, comparing his relationships with his workers to those of a family, saying that he tries to "create a healthy ecosystem making everyone a member of the team" and that "everyone should contribute through their talent, like a playground."

Furthermore, the residual respondents called for a non-hierarchical leadership style in which workers were assigned significant responsibility. Several respondents have emphasized the importance of coaching in today's leadership position. According to one of the respondents,

as students and the instructor, "you learn to govern through goals rather than micro-managing," according to one of the respondents.

One respondent predicts that there will be more complex activities remaining that include human interaction, imaginative thinking, or both. As a result, it places a greater emphasis on teamwork rather than strong leader. Instead, it would be best if you promoted innovation and high-performing teams, which is already true today but will become even more so tomorrow.

Another respondent agreed, emphasising the importance of fostering employee happiness in the future with AI. "The in those, how happy workers are with their jobs, would be even more critical how you handle individuals and how they view their working life," the respondent said. Respondents have placed a premium on the social nature of the future workplace and human interaction. "Personal relationships are a big part of working life, and AI cannot help with that. It only occurs between individuals." "You want to maintain the intimate connection between humans, to be able to meet and speak to each other," one respondent continued. The critical element was also listed as being necessary for completing specific work tasks. "The bigger picture is very complicated for a robot to see," one respondent said. "One can never believe that processes and resources can replace human imagination and intellect," another respondent said. "Sometimes you need to speak to real humans that understand local circumstances."

These results indicate that today's leaders appreciate a more supportive leadership style in which workers are granted responsibilities and independence, which will be valuable in the future workplace. Furthermore, organisations behave the future leader in developing a long-term work atmosphere that allows people to succeed while also fostering innovation. Finally, future leaders are expected to value social aspects and an emphasis on personal relationships.

iv. How will New Zealand's future play a valuable part when it comes to making important decisions and setting up a framework and rules for AI?

The respondents' perspectives on how AI can learn and make choices in the future varied slightly. Some respondents expected that AI would play a more significant role in decision-making and learning in the future. One respondent put it this way: "Sometimes in the future, you will also have a robot that can look at the big image. They will get there, but it will take time and effort, just as it does for humans." Another respondent predicted that AI would be embedded in self-learning algorithms, allowing it to "learn from its own experiences."

On the other hand, others had a different perspective and made it hard to envision a future AI introduced in organisations would learn on its own. "I do not think it knows," one of the respondents said, "people rather program it." Some respondents shared even more skepticism about AI's right to make choices on its own in the future. "To have self-learning programs that can make the correct choices without the need for supervisors or leaders, that is a frightening idea," one respondent said. The same respondent went on to say, "A CV application, for example, might use AI to search CVs and determine who to recruit without any human contact or soft values. I'm not sure we want that kind of culture... We do not do it in my business." Besides, as one respondent put it, "We should not give machines the authority to make decisions for us. Internally, you can not depend on a machine to tell you what to do; you have to think of it yourself."

Also, in a future with AI applied in the workplace, the majority of respondents agreed on the value of a leader's human presence. "AI-bots are already wiser than us in limited fields," one respondent said, "but they cannot see the entirety in the same way that we humans." "Using data

as a basis for making decisions is necessary," another respondent said, "but you cannot exempt humans from such a process." "Data is useless if you do not understand it or have any insight into it," said the same respondent. Furthermore, "a computer can make errors as it can see something that a person can see coming," according to one respondent. The future leadership position, according to respondents, will include teaching and establishing AI laws. According to one respondent, "The structure and rules for the computers must still be defined by humans. I want to think that the chief will be in charge of this." The same respondent went on to say that in the future, "someone who develops the rules and can think design-people who do the projects for AI" is still needed. Another respondent clarified that for AI to work correctly, the leader must create filters through which AI can operate. The leader must then start repeating the filter and monitoring AI to ensure that AI improves over time. The significance of personal presence was also highlighted by the respondents from an ethical and emotional standpoint. As one respondent put it, "I do not believe a computer will ever think humanly or intelligently enough in terms of emotional intelligence. To regulate the machines, you need an ethical dimension ". One respondent went on to say that AI will remove feelings and personal associations that would otherwise influence organisational actions, which is beneficial because it allows for objective decision-making.

The respondents have differing opinions about the role AI will play in organisations' future, especially in terms of its ability to learn. The respondent' expectations for the leadership position, on the other hand, are more aligned, indicating that the leader will continue to play an essential role in the future. The leader is supposed to keep hold of the AI by looking at the big picture, establishing ground rules, and providing AI with an ethical and emotional guide.

CHAPTER: 3

Beneficial Aspects of AI

The majority of businesses today tend to work with artificial intelligence. In reality, it should be even if we consider A.I.'s remarkable market performance. In general, it is growing in both the economic and social spheres. Regardless, how helpful is it to the workplace? It is reducing the repetitive and time-consuming activities that were driving up production costs. This part of the research will uncover and discuss A.I in terms of it.' According to a Hoover Institution Annenberg Distinguished Visiting Fellow Sam Nunn, artificial intelligence and other emerging technologies promise improvements in health, safety, and efficiency, but large-scale economic changes are unavoidable. He studied physics at Stanford and worked as a senior advisor at the Department Of state from 1983 to 2016, responsible for weapons control and disarmament. He now researches the effects of new technology, including artificial intelligence[34].

When combined with other cutting-edge technology such as robotics and 3D printing, artificial intelligence can result in more efficient products like service production. Advanced robots can progressively perform manual tasks, and machines can be programmed to perform various non-routine cognitive tasks. Increased productivity and reduced costs will benefit society as a whole, but many ordinary employees will suffer as a result. According to research, about half of today's jobs work in sectors that are likely to be disrupted shortly.[35] Robots will replace

[34] Stuart Russell, Daniel Dewey and Max Tegmark, "Research Priorities For Robust And Beneficial Artificial Intelligence", AI Magasine 36, no. 4 (2015): 105-114, doi:10.1609/aimag.v36i4.2577.

[35] Ibid

truck drivers in some situations. In other areas, such as education and medicine, work would be transformed, with robots taking on specific tasks while professional humans perform others.[36]

3.1. Benefits of Artificial Intelligence at Workplace:

Artificial intelligence can assist in the evolution of jobs, which can support the economy. Robots and A.I. can help people in performing their tasks more effectively, not replace them. (sic) Man and machine working together would be invincible. A.I. will become more intelligent over time with deep learning and machine learning, increasing its productivity. A.I. would also reduce the risk of human error and evaluate historical data to save money. The importance of facial recognition, pattern recognition, and digital content analysis will be enormous. Scientific work, exercise science, and technology companies will lose all profit.[37]

A.I. increases the flow of knowledge and productivity so that people can use the opportunities. The new revenue sources, savings, and work opportunities are what we are talking about. Artificial intelligence enhances users' lifestyle choices by using algorithms that provide personalised knowledge. A.I. is responsible for all world-class activities, such as data entry and e-mail answers. A.I.-powered intelligent homes can save energy and improve safety.

The advancement of technology has led to the improvement of humanity's condition throughout history. Consider the use of power in the home and the car. Artificial intelligence (A.I.) can exceed these because computers would be able to assist humans in solving more severe and complex social problems. Innovation will reign supreme, and people's quality of life will increase. By automating mundane tasks, artificial intelligence will dramatically boost human

[36] Ibid

[37] Stuart Russell, Daniel Dewey and Max Tegmark, "Research Priorities For Robust And Beneficial Artificial Intelligence", AI Magasine 36, no. 4 (2015): 105-114, doi:10.1609/aimag.v36i4.2577.

imagination and ingenuity. More time will be available for people to read, experiment, and explore.[38]

For Medical and Health Services, since an A.I. watch can track users 24 hours a day, health care providers would be better at diagnosing. Artificial intelligence can assist people in expanding their medical awareness and understanding. A.I. diagnoses based on images may assist doctors to treat their patients more effectively.

As per the A.I. Forum of New Zealand, artificial intelligence (A.I.) could add more than $800 million in value and savings to the New Zealand health system each year by 2026.[39] New Zealand's district health boards are currently facing a $500 million annual deficit. The latest A.I. study report from the A.I. Forum of New Zealand, A.I. for Health in New Zealand / Wellness, provides Kiwis with new knowledge on A.I. and health. However, we will look at other industries around the world where Artificial Intelligence is critical to success.

3.1.1. Customer-Centric:

According to the Accenture Global Market Pulse study, 61 percent of those who responded to a survey said A.I. implementations could boost customer service by allowing for faster delivery. The businesses are focusing their energies on reducing delivery times.[40] A.I. will help workers and consumers solve problems, resulting in higher resolution rates and improved work ethics. On the other hand, some workers are concerned about A.I. advancements because they believe it will lead to the automation of their work. Human contact will continue to be an essential part of business; businesses are constantly using emerging technologies to communicate

[38] Ibid
[39] Above in 32.
[40] Above n 33.

with consumers, such as video chatting. The variety of communication methods reduces waiting time and allows for quicker problem-solving.[41]

3.1.2. Improve Employee Engagement:

As per IDC, customer service demand will increase by 20% in the next few years. Employees who want to work in these programs must learn how to use artificial intelligence to complete tasks. These tasks would assist in the growth of their personalities and the development of their customer service experience. People who want to learn more about artificial intelligence and its applications in the real world can enroll in an online class for artificial intelligence engineers, which will provide them with an in-depth awareness of A.I. and its applications in the real world, enabling them to advance their careers faster. A.I. assists in removing repetitive activities, and advanced A.I. technology such as chat bots allows for improved efficiency in other fields. Employers will be encouraged to use their free time to work purposefully in their jobs due to the process, which will promote innovation in the workplace.[42]

Furthermore, A.I. has streamlined a process that had traditionally taken millennial hours to complete. Every employee wants to progress professionally and be a part of significant projects, and A.I. can assist them in accomplishing this goal. The workplace can use A.I. to simplify day-to-day activities and procedures, saving money and time. A.I. may also help in the prediction of outcomes based on data gathered by cognitive technologies. There are undoubtedly several other advantages that have the potential to transform an organisation's entire operation. It only takes an open mind and a desire to seize potential opportunities.

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[41] Above n 36.

[42] Shamil Mamedov and Stanislav Mikhel, "Practical Aspects Of Model-Based Collision Detection", Frontiers In Robotics And AI 7 (2020), doi:10.3389/frobt.2020.571574.

3.1.3. Claimed Benefits of New Zealand:

Higher productivity would almost certainly produce a trillion dollars. What are the advantages of making this new technology so attractive to economists? How can it lead to better public policies and the provision of public services? The New Zealand Data Commissioner and Chief Data Steward state that "simple public profit" has to be achieved by collecting and using public data. The Algorithm Evaluation Study discusses seven aspects in which the government's existing predictive analytics usage satisfies this requirement. New Zealand's health system is facing problems. Increasing demand, increasing customer preferences, and the stresses of an aging population are just a few of them. It can also help with new drug creation, complement human specialists' work through image processing and robotic surgery, automate hospital procedures, open up more time for doctor-patient interaction, and provide individualised care.[43]

A.I. can generate multiple economic benefits across various industries, including increased labour productivity, more efficient product and service production, and increased market demand. A.I. is expected to revolutionise how companies compete and expand, as it is defined as an entirely new production element that increases profitability. The potential economic impact of A.I. is measured in gross value added (GVA), a near approximation of gross domestic product that accounts for the value of products and services produced, according to global research by Accenture29. The study looked at 17 industries in developed countries and compared their projected growth rates in 2035 to an A.I. scenario that showed expected growth with A.I. incorporated into economic processes. It is launched that A.I. can raise economic growth rates by 1.8 percent on average across all sectors. Even labour-intensive industries like

[43] Ibid

education and social care, which have historically had slow productivity growth, would see a substantial increase in GVA.

3.2. Accuracy at Workplace:

Predictive algorithms have a substantial benefit compared to human decision-makers in terms of judgment precision. Again, more input variables and more examples of training should be taken into account. You can also overlook variables that do not matter so that people do not. An analysis of the decisions taken on a ban by New York police officers revealed that almost as many covered guns as human cops could be the detective in a mathematical model of the station and even fewer people checked – and that it was less inclined toward the Hispanic and the Black. RoC-RoI is a method that performs a thorough analysis of results for decades. Although human workers are aware of relevant research in situations where several factors influence the decision, for example, the probability of a particular person committing crimes, they are invariably less reliable to measure chances. When new information becomes available or unique decision-making constraints are enforced, learning algorithms may change their functions quicker than human ones. However, over and above these benefits, determining accuracy remains a significant challenge.[44]

The efficiency of a decision making process in some cases is determined by its number of errors and types of errors. Data scientists use an uncertainty matrix as mentioned in Section 1B to evaluate a binary classification result that describes the ratios of true positives, real negatives, false positives, and false negatives in their decisions. As mentioned earlier, if the performance of a system is not optimal, the advantages and disadvantages will always exist between false and

[44] Shilpa Verma, G. T. Thampi and Madhuri Rao, "ANN Based Method For Improving Gold Price Forecasting Accuracy Through Modified Gradient Descent Methods", *IAES International Journal Of Artificial Intelligence (IJ-AI)* 9, no. 1 (2020): 46, doi:10.11591/ijai.v9.i1.pp46-57.

false positives and true positive and true negative ones. For other domains, various trade-offs may be required. The developer first needs to identify a performance criterion in the neural network to effectively use a predictive algorithm and then adjust the procedure so as to optimise it. Politicians will need, however, to transpose cost-benefit and rights-and-obligation goals into software developer guidelines which are easier to say than to do.[45]

It is much more challenging to evaluate the consistency of human and computer thinking that combinations that hold in a dataset as a whole are far less precise when data is partitioned. Whereas the accuracy of the COMPAS algorithm is equal to human experts making criminal judgments on recurrence, it was highly unreliable when predictions were limited to people with violent offenses on the same dataset. Finally, fundamental accuracy standards are rarely very high, for decision-makers whether human or computational: an AUC of 0.8 is considered appropriate in several situations for asynchronous systems. Therefore, it is essential to be aware of the accuracy of the predictive algorithms' results from the tools used. Similarly, the interventions creating the risk of error and the kind of misunderstanding common in predictive algorithms used to make operational decisions should be considered. The widespread belief in the absence of ethical principles as punitive measures for policy proposals that bring profit can only be sustained if the overall precision level is sufficiently high. According to the Algorithm Evaluation report, almost all segments use operational algorithms to guide rational decisions rather than to automate meaningful choices. Usually, citizens have authorisations or opportunities if decisions are made automatically. None of the participating agencies identified a situation where an immediate and non-human supervision negative judgment concerning a person affected the entitlement, the rights, or the access to a service.

Even in situations where unmonitored decision-making only benefits data subjects, a system with inadequate precision will result in many people in need of assistance not receiving it. Although this may be solved objectively by making the related algorithms err on the generous side, this technique's cost renders it unfeasible for low overall accuracy.

3.2.1. Justice:

In organisation-wide decision-making, predictive analytics are preferred because they are statistically validated tools that are objective so that unhelpful people are not. Predictive algorithms use huge data of related variables measurements. They are estimated by famous statistical methods. Thus, the use of different algorithms may be checked in certain contexts. The methods for high-stakes decisions affecting New Zealanders tend to be the most impartial, as defined. There are many reasons why this up-to-date assessment is suspicious. The objectivity of science in the abstract is difficult to establish and much more difficult to accomplish.[46]

Objective judgments are, according to the philosophical definitions, those which are not affected by the individual or social groups' beliefs, perspectives, or wishes. With predictive analytics, it seems particularly unpredictable to say that science would somehow throw away the perspectives of scientists. Good data science abounds in both intuitive and evaluative decisions. For instance, a data scientist must first be identifying the best way to identify and quantify homelessness in order to create a method to help alleviate poverty. Such questions are often assessed on the basis of moral and political assumptions, like whether homelessness is mistaken or whether people are entitled to proper housing. Most importantly, all of the predictive

algorithms basically combine large groups of previous decision-making. An algorithm such as the arrest and convictions of PredPol is not and cannot be assessed based on objectivity.[47]

None of this suggests there are certain intrinsic flaws in data science. Rather, it is important to understand that the objective nature of field research is often difficult to determine and is often a matter of degree. As a consequence, it is not a good idea to give people who use algorithmic tools the impression that the "objectivity" of predictive algorithms gives them an essential benefit over decision making. Moreover, in the current state of technology, we would not want high-stakes opinions about the lives of citizens to be entirely probable, without any room to protect data objects from inexorable rule activity. The decision-making of public servants should, of course, be equitable and free from various forms of harm, but total objectivity cannot be expected. After all, the inequality includes fair and unfair treatment of the unfair, as Aristotle has long discovered.

3.2.2. Fairness at Work:

If impartiality is valued, it can be advantageous for algorithms to choose without human interference. This is particularly important when it comes to determining how scarce resources are distributed. The Access Criteria Clinical Prioritisation method of New Zealand is a rating program built upon a crowded health system to give priority to elective surgery. It gives a score based on scientifically defined criteria for each patient's attention. The CPAC offers a "fairer and more reliable form of national prioritisation," as stated in the Algorithm Assessment Report.

The word "fair" refers to the perceived fairness of using an algorithm that knows little about each patient except the details related directly to the potential advantage derived from the

emergency visit. In these situations, the use of algorithms shows that Aristotle's conception of justice is treated equally with similar cases. However, it is difficult to avoid making value assessments of some kind when developing a ranking system. A standardised classification system changes a weighted total over the various weighted factors, as mentioned earlier. When the weights are specifically defined, the sensory senses of the designers are integrated into the relative value of the different variables. Likewise, if the consequences are trained to approximate a "Gold Standard" ranking established by experts, the experts' insights into relative value are effectively built up. Recent studies show that public perceptions of fairness are remarkably nuanced, varying significantly from person to person, complementing the definition of fairness.

3.3. Operational Efficiency & Transparency:

It has taken almost a decade to address the industry's safety and security issues. Disruptive technology has been a significant source of concern throughout history. But, as time has passed, A.I. is now bringing enormous benefits to society. It has increased throughput and performance by introducing new revenue-generating, job-creating, and cost-cutting opportunities. Furthermore, automation has minimised human error by directing humans toward the value chain in a more orchestrated manner, allowing them to learn the value of strategy rather than focusing on the supply chain. A single error can cost millions of dollars. Adoption of A.I. in everyday activities helps them to devote more time to their to-do list. Reducing administrative tasks encourages humans to make errors more often and correct them more effectively.[48]

Given that a large number of organisational decisions are required by many government agencies, quality and cost are essential. Consequently, it is not shocking that many of the "public

[48] Marc Maier et al., "Improving The Accuracy And Transparency Of Underwriting With AI To Transform The Life Insurance Industry", *AI Magasine* 41, no. 3 (2020): 78-93, doi:10.1609/aimag.v41i3.5320.

benefits" of algorithmic decision-making in the algorithm evaluation report are just gains inefficiency. It is important to remember that productivity does not only save money. The algorithms of the New Zealand government allow staff to spend more time on complex and less time on easy cases. They also benefit from better working conditions for employees by relieving them from tedious "mechanical" decision making. Certain "mechanical" decisions are probably still to be taken by humans to provide the algorithms that work with them with new data sets. The efficiency of predictive algorithms may accelerate and enhance the accuracy of critical human-government interactions. This obviously depends on how well improvements in productivity improve service rather than on reducing costs by reducing the number of employees who provide a specific service.[49]

In a country like New Zealand, where the government is small and taxes are low compared to other OECD countries, securing efficiency gains is especially important. This is significant because New Zealand has a limited budget for public service delivery. Our low government expenditure has arguably intensified several unsolvable social problems, such as our astronomically high incarceration rate, especially among Maori.

Many algorithms are too abstract for people worried about their use to gain valuable information about how they function. If algorithms will be well and difficult to "game," making information of algorithms like RoC*RoI public can be beneficial. Offenders can only boost their RoC*RoI score by committing fewer offenses. Given the general difficulty of explaining deep learning algorithms, securing this transparency advantage for more accurate yet more complicated deep learning algorithms would be difficult.

Transparency covers various questions about algorithms, perhaps in keeping with the politically or philosophically ambiguous concept that it is. In its broadest sense, transparency refers to openness or answerability, meaning a general sensitivity to information requests or a willingness to explain acts taken or contemplated. This is a complex or ongoing state of affairs in the political, community sense of the word. We trust our elected officials to behave in the people's best interests, and accountability demonstrates their ability to do so. It is less possible for the government to become insular, self-serving, or dishonest when it is transparent, answerable, and accountable to its people. Transparency, in this broad sense, is therefore preventative protection against power violence. Although all democracies theoretically respect accountability, it is a nebulous and aspirational concept. From here, the idea will go in at least three different directions, which each leads to much more concrete and less abstract territory.[50]

In conclusion: New Zealand has a long history of carefully crafting predictive algorithms that favor the public. Despite this, the advantages offered by these architectures are complex and challenging to assess. None of the above objectives can be followed in isolation; it is relatively easy to improve an algorithm's accuracy at the cost of making it too primitive to be helpful. The various advantages that predictive algorithms have can often conflict.

3.4. Economical Potential Automation:

Aspire, a research partner of the A.I. Forum, looked at 20 industry classifications in New Zealand to see how easily they are supposed to accept A.I. and the economic benefits that would result from labour conversion. A.I.'s overall potential effect on labour conversion through these industries is expected to be between $23.4 billion and $54.8 billion by 2035. Essentially, the ability of AI-driven systems to replace at least some human labour inputs yields economic

benefits. The presumption that human labour substituted by A.I. is reallocated to more valuable tasks within each industry underpins this study.

Several major consultancies have issued studies on the economic applications of Investing. In terms of the impact on U.S. healthcare, Accenture estimated in 2018 that A.I. would save US$165 billion by 2026,131, which is around 3% of the entire US$5.5 trillion healthcare budget expected for that year. Accenture forecasted a 42 percent compound annual growth for the health A.I. sector through 2021, with a tenfold increase in five years from 2017 to 2021. The economic effect of A.I. will be felt across the board in healthcare. According to Kheiron Medical, A.I. in diagnostic imaging will be a US$2 billion global market by 2023. The following six main factors also influence the projections:

• Depending on the types of employment done in each industry, A.I. can replace human labour inputs.

- the willingness and motivation of companies to implement new technologies;
- the overall's close of labour as a factor of production; • the pace of growth of the adequate human labour force;
- the general rate of technological progress.
- the actual rate of increase in the prices of computer technology used to introduce A.I., which affects the rate of growth of the A.I. "labour force."

Because of the variety of these variables, estimates of A.I.'s effect vary by industry. Since industry adoption of A.I. is so unpredictable, both low and high estimates are given. A.I. is more likely to support businesses with a large labour market and widespread use of technology. Meanwhile, industries with limited labour pools and low technology adoption, such as

agriculture, may expect less direct gain from AI-driven labour efficiencies. The projections guide the future value of A.I. in each industry once the technology has matured to the point that several New Zealand companies have embraced it.

Artificial Intelligence (A.I.) ushers in a new technological age, but its revolutionary potential in economic terms has yet to be realised. It will change the development factors, reshaping employment and our perceptions of work, efficiency, and value creation. A.I. has the highest opportunity for economic growth in the tech industry. Integrating artificial intelligence (A.I.) into legacy communications and information systems is expected to quickly produce substantial expense, time, and process savings. Cloud, network, and network administration are all high-growth fields of this sector.

As the global market for nontraditional products such as synthetic proteins becomes more competitive, A.I. will become a crucial enabler of the precision agriculture needed to produce higher-quality products sustainably. A.I. is projected to have a less direct effect on profitability due to the relatively low absorptive potential of technology combined with a limited workforce. However, if the industry can speed up its adoption of IoT, it can lay the groundwork for AI-assisted precision agriculture, which is essential to sustain global competitiveness and profitability.

Production is expected to be a big adopter of the Internet of Things (IoT), which will serve as a strong catalyst for A.I. adoption. Based on the proliferation of IoT devices, networks, and terabytes of data they produce, A.I. is expected to lead to a substantial increase in manufacturing profitability. Supply chain, forecasting, inventory optimisation, and production scheduling are only a few of the areas where A.I. can make an immediate difference in this

sector's income and long-term economic outlook. By 2035, A.I. would have significantly altered the educational environment. Education is expected to benefit considerably from A.I. since it is one of the most labour-intensive industries. Teaching workers will create new learning models by using personalised learning systems and automating mundane, routine tasks[51].

According to New Zealand Treasury projections, the country will invest nearly 8% of GDP in universal care by 2026. New Zealand's GDP is expected to reach US$213 billion by 2026, according to the OECD. 132 In 2026, this could amount to a US$17 billion investment in New Zealanders' welfare. Scaling Accenture's 2.7 percent effect of A.I. by 2026 the United States To the New Zealand health market, this equates to A.I. producing at least US$460 million in added value and savings by 2026 (over $700 million in NSD at USD to NSD 1.60). According to the A.I. Forum's 2018 Shaping a Potential New Zealand survey, this number could grow to NS$1.6 to 3.6 billion by 2035.

[51] Fang Wan and Chaoyang Song, "Flange-Based Hand-Eye Calibration Using A 3D Camera With High Resolution, Accuracy, And Frame Rate", *Frontiers In Robotics And AI* 7 (2020), doi:10.3389/frobt.2020.00065.

(Figure 01: Health Spending in New Zealand) see footnote 52.

These benefits will be realised gradually over time, with a maximum effect over several years, and will help resolve the 'iron triangle' issue in healthcare. This is when the three interconnected considerations of accessibility, availability, and effectiveness all need negative trade-offs. A.I. will help improve access, availability, energy, or all three, without compromising the others.[52]

3.5. A.I. Source of Job Creation:

Although A.I. has been debated for several years, it is only beginning to gain momentum, with analysts forecasting annual growth of $9.7 billion in 2020 to $120.6 billion in 2026. In reality, A.I. is assisting businesses in enhancing customer care, arranging schedules, verbally responding to queries, automating recruiting processes, and detecting when machines need

maintenance. Automation activated by A.I., as has been commonly speculated, would possibly remove such rote tasks. To control storage environments, for example, you'll need fewer storage managers. The introduction of automatic watering systems based on sensors that monitor the moisture in plants in big box building supply stores would phase out the need for dedicated plant caterers.[53]

Others must also mount the sensors and create a program that publishes the A.I. solution's algorithm. As a result, developers, data scientists, and elevated computing (HPC) managers will demand higher demand. There are two ways in which A.I. can generate employment:

1. Specifically, people will be required to develop, sustain, and enhance A.I. technologies in the AI-producing market.
2. Indirectly in other sectors: In cases where technology does not fully replace humans, people may use and oversee technology. Consider how humans help at automated airline check-in and store checkout lines.

Since A.I. is only one subset of the wider range of ICT technologies, we can expect that the number of A.I. workers in New Zealand would be no bigger than the number of employees who work in ICT occupations.

In New Zealand, ICT occupations accounted for 74,500 jobs in 2015, up from 47,400 ten years earlier. In 2017, ICT workers accounted for about 5% of all jobs, rising at a rate of about 4% per year, four times larger than overall employment. The number of ICT jobs would double every 18 years at that rate of growth. If growth continues at its current pace, direct ICT jobs are projected to account for nearly 300,000 jobs by 2055. A.I. would not account for all new ICT

jobs, as it would mean that it has supplanted all other technologies; however, we can predict that growth in A.I. and the tech sector, in general, will generate a large number of new positions. The indirect creation effect, on the other hand, is difficult to estimate. Computers have been introduced into almost every industry over the last 30 years, and virtually every job now requires some kind of technology. We can assume that the same would be true of A.I. in the future, with some employees being highly skilled at using A.I. software in their jobs and others still unsure how to do even basic tasks. If A.I. develops in this manner, every job will eventually include a component.

The anticipated efficiency gains and more productive use of resources, combined with consumer demand, are expected to stimulate new goods/services, resulting in the indirect creation of new employment. In a study of occupations in the United States in 1999 and 201432, it was discovered that nearly 500,000 people employed in 2014 in occupations that did not exist 15 years before. Between 1999 and 2014, the U.S. labour force increased by 17 million people, which means that new employment that did not exist 15 years ago accounted for around 3% of overall job growth.

3.5.1. Demographical Benefit:

Artificial intelligence (A.I.) may be used to resolve future labour shortages and tackle a looming demographic crisis. A range of industries has raised concerns about aging workers and the potential threats to society if it is not tackled. Annual declines are being recorded in some industries, with more employees leaving than joining these positions. This is particularly evident in healthcare and education, where numerous healthcare workers and teachers are in short supply. A.I.'s capacity to automate repetitive tasks could present an opportunity for it to be used in these and other sectors to help offset the shrinking labour pool. Investment in programs to help

the remaining workforce is supposed to be driven by the necessity of sustained change in social programs in the face of increasing labour pressures.

3.5.2. Deficiencies Increment in Health Sector of New Zealand:

The Triple Goal of the National Institute Of health Improvement emphasizes that healthcare should improve population health at a low cost while providing positive patient experiences. A similar Triple Goal has been adopted by the New Zealand Medical Quality and Safety Commission. The essence and extent of A.I.'s effect on health should be assessed against this backdrop. The well-being of healthcare professionals is a fourth factor to remember. Since the government funds most healthcare spending in New Zealand, healthcare efficacy and value are critical. When expert consulting, high-powered computation, and efficacy assessment are factored in, A.I. solution development costs can be quite high. This could make deploying a product that only performs as well as humans less cost-effective. The unit benefit of scaling an A.I. solution, on the other hand, maybe close to zero. This may be an impetus for the government to invest in the production of scalable solutions.

A.I. would assist in the elimination of the 20 to 30 percent of health spending that is squandered. System shortfalls that could be resolved and avoided, such as delays in care delivery, under, and insufficient care delivery, are among the causes of waste. Artificial intelligence will assist in the elimination of inefficiency by streamlining work procedures and healthcare delivery. A.I. will monitor every bed's occupancy in tomorrow's hospitals and use predictive analysis to forecast demand. Intelligent 'command centers are now being used at Johns Hopkins University in Baltimore, Maryland, to boost productivity and capacity. "Emergency room patients are assigned a bed 30 percent faster; transfer delays from patient rooms have been reduced by 72 percent. Ambulances are sent 63 minutes faster to pick up patients from other

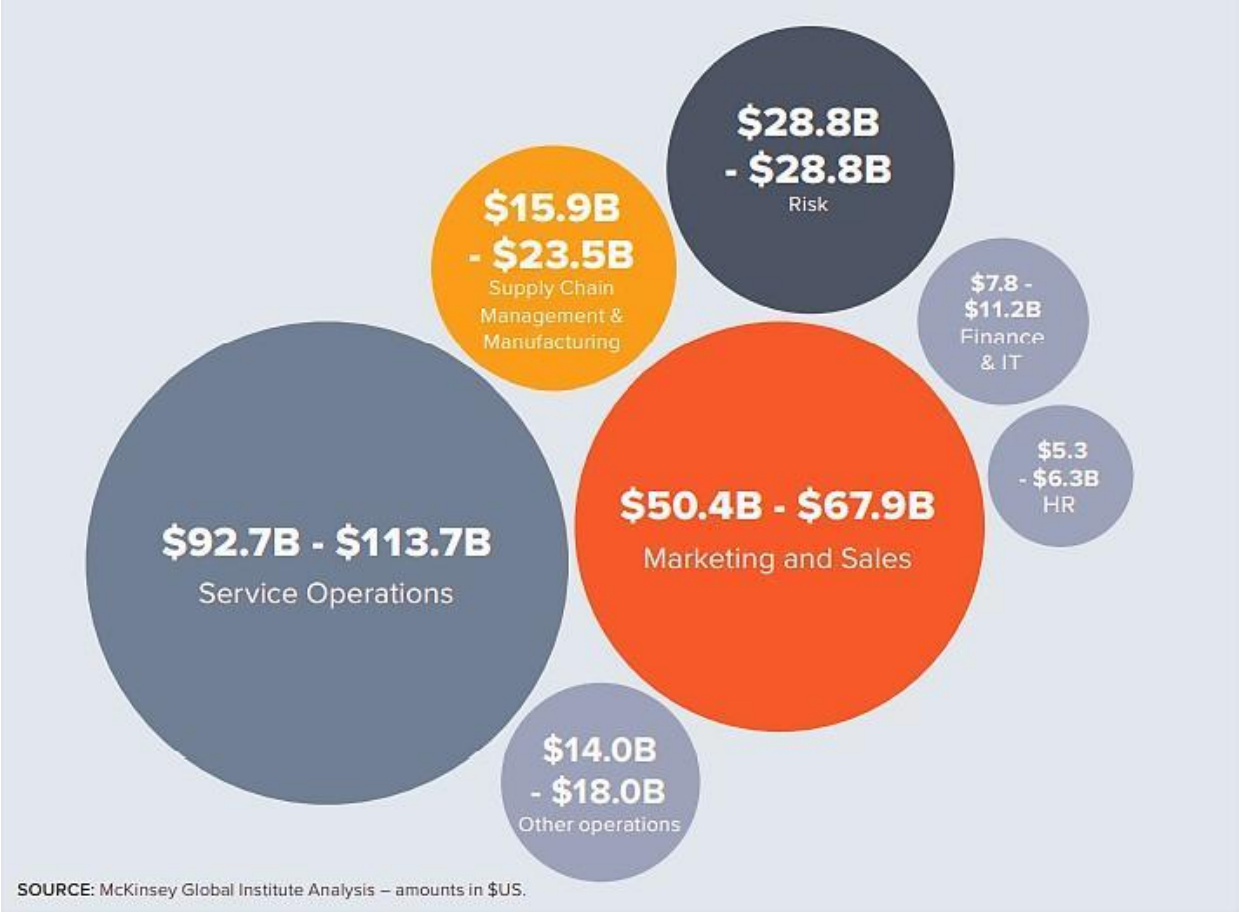
health facilities; and the ability to accept people with severe medical conditions from other hospitals," chief administrative officer for emergency responders and capacity management. Intelligent technology has the power to address our overburdened healthcare systems' crisis on a large scale.

3.6. Enhancement of Cost-Effectiveness:

Significant gains in non-clinical areas of healthcare are predicted by the study (McKinsey Global Institute). As a result, A.I. would increase the cost-effectiveness of healthcare. McKinsey looked at how artificial intelligence (A.I.) could add value to healthcare networks and applications. These potential savings were projected to be worth up to $269.4 billion per year. According to Accenture's review, the "top 10" A.I. in health applications would "think and pay for themselves." One hundred thirty-seven words The question of whether a medication is too costly for the amount of health value it offers is a recurrent controversy.

A.I. can minimise costs while sustaining or enhancing health outcomes. Health technology evaluation aims to find healthcare interventions that make a real contribution to treatment outcomes while still being affordable or even cost-saving. Many emerging health innovations are costly and only have limited health benefits. A.I. has the potential to be both low-cost (once development costs are covered) and effective (Figure 2). This type of cost-benefit analysis should be required for any new health technology[54].

[54] Ying Jiao Shao et al., "Cost-Effectiveness Modeling Of Repetitive Transcranial Magnetic Stimulation Compared To Electroconvulsive Therapy For Treatment-Resistant Depression In Singapore", Neuromodulation: Technology At The Neural Interface 21, no. 4 (2017): 376-382, doi:10.1111/ner.12723.



(Figure 02: McKinsey Global Analysis) see footnote 55.

By 2035, New Zealand would need a much larger health workforce. This is due to an aging population's care needs and raising public perceptions. According to McKinsey's report for the Prime Minister's Business Advisory Council, healthcare will create 90,000 net jobs by 2035. Between 2016 and 2018, the health sector's labour productivity grew by -0.6 percent. There is a looming workplace crisis in the health sector, and automation will play a key role in solving it. According to the Nursing Council of New Zealand's "Future Nursing Workforce" survey, if things proceed as they are, the nursing shortage will intensify after 2021, hitting 15,000 nurses by 2035. In New Zealand, there are currently between 55,000 and 60,000 nurses. The good news is that artificial intelligence will assist.

Sensibly, a conversational A.I. company has collaborated with health organisations worldwide, including the NHS in the United Kingdom. A.I. can save nurses 22 percent of their time, according to their early deployments. This leads to a 27% rise in the number of successful nurses. This means that A.I. applications will effectively add up to 14,000 nurses to New Zealand's nursing workforce without affecting the existing workforce. Other forms of healthcare professionals and back-office staff can experience similar efficiencies[55].

3.7. Reduction in Disease Issues:

According to Accenture, A.I. can support healthcare by resolving 20% of unmet clinical needs. The use cases mentioned would result in a reduction in the burden of illness. One of the Triple Aims of healthcare is improved population health, which can be achieved by better prevention, testing, diagnosis, treatment, follow-up, and end-of-life care. Patient safety improvements, fewer misdiagnoses, and more precise targeting of appropriate treatment all help lessen illness risks. However, it will be critical to show the efficacy of A.I. applications unequivocally. According to Accenture, A.I. can support healthcare by resolving 20% of unmet clinical needs.

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[55] Ibid
[56] Ibid

3.8. A Rise in Equity:

The healthcare system must offer access options so that anyone can receive healthcare advice and services when they need it. It's also critical that healthcare is provided equitably so that no one suffers due to their circumstances. A.I. is assisting in the improvement of health access and equality and encouraging patients to make more educated and safer health choices. A.I. has the potential to offer healthcare to underserved communities and areas. Access to healthcare in low-income countries can be especially difficult. Computer vision apps, such as those developed by oDocs in New Zealand or Google DeepMind for smart eye diagnostics, may be used to scan millions of people for eye disease without them needing to see a doctor. In conjunction with computer vision and intelligent analytics, health chat bots could soon deliver basic healthcare to millions of underserved people for almost no cost. Even if the programs in place are not ideal, for many people, having some healthcare is preferable to having none. There are many opportunities for AI-assisted care delivery in remote and rural areas. A.I. has the potential to improve patient management equity. In New Zealand, there is often a disparity between Mori and non-Mori referral rates for specialists. Precision Driven Health is creating a machine learning model to measure and triage cardiology referrals to increase diversity and eliminate implicit bias in healthcare referrals. Patients should be referred solely based on their health needs since A.I. should be trained to recognise who wants to be seen first based on medical knowledge from various sources.

3.9. Artificial Intelligence in Criminal Justice System:

As bizarre as it might be, artificial intelligence has already found its way into the criminal justice system. To combat racism, many police agencies and courts were turning to artificial intelligence. A computer now does stereotype and risk assessment. To make a recommendation,

A.I. searches for trends in criminal history and historical data. In theory, the study should be free of ethnic, sexual, or other prejudices. According to sources, A.I. is being used to put people in prison for the wrong reasons. It is incorrect to say that an individual has a "high risk" of potential criminal activity with no background. It's similar to the movie "Total Recall," in which people are apprehended before committing a crime. Since lives are at stake, if the justice system uses A.I. in the long run, it must be carefully vetted and reliable. The processing of information would be quicker, which is a welcome advantage of A.I. in the justice system. Algorithms may be used to look up someone's criminal records or other public documents on the internet. Shorter lines at the courthouse or police station will ease pressure on police officers and state prosecutors.[57]

Automation has an important impact on situational awareness. In self-driving cars, this may be most clearly shown. If a semi-autonomous vehicle requires control of the human driver again, it sends the human driver a "take-over order." But drivers in the "autopilot" mode respond much slower than when in full power to these requests. In a short time, it is hard for most people to go from low to large workloads. Another dilemma is the operator's "beginning to believe that the machine is unfailing and thus is no longer able to actively track what is happening, implying comfort," given the progress of technology and the reduction of human functioning. The operator assumes that the system is reliable, resulting in failure detection.

Automation bias, which occurs when human operators 'confide so much in the automation process that they ignore all knowledge sources, including senses,' is associated with automation complacency. Self-indulgence and prejudice 'describe a human operator reaction caused consciously or unconsciously by over-confidence in the proper operation of an automated system.' These questions are pervasive and ultimately insoluble, according to decades of studies.

[57] Ibid

Experts and novices appear to be affected and are generally immune to training. Their effects are also visible outside the system of human machines. For example, the relevance of forensic evidence, a phenomenon known as the "CSI Effect," is commonly overlooked by law enforcement officials, judges, and jurors.

n The Unemployment Insurance Corporation in New Zealand has traditionally relied on manual supervision to process claims. Previously, this entailed ACC employees going through and reviewing individual allegations one by one. Also, with advances in case management practices over time, such as technology that allows for online transmission, all claims have needed manual processing to some extent. As previously reported, the ACC has adopted a new claim registration and coverage evaluation process. Its goal is to make the claim approval process more effective and faster, eliminating the need for manual control in most cases. The ACC hopes that by using the power of big data to analyse 14 million durable designs between 2011 and 2017, it would be able to minimise wait times for approvals while also distributing more complicated claims more effectively to ACC teams for final decision. An examination of publicly accessible knowledge about the system's operation reveals that it exemplifies many of the DCAF approach's benefits.

Nonetheless, we would advise extreme caution before introducing any sort of suboptimal automation in high-stakes/safety-critical environments. After all, many of these programs are tools with a reputation for questionable prejudices and inherent technological limitations. Even as some of these systems begin to resolve their weaknesses, we are concerned that the control issue will resurface, catching human operators and decision subjects off guard. It would be all too easy for a judge suffering from judgment fatigue, for example, to simply believe what a predictive risk method "objectively" implies.

CHAPTER 04

The Impact of AI on Labour & Skills

The nature of work and the worker will continue to evolve due to the industry's global nature, shifting demographics, and changing mobility patterns. For the next five to ten years, the landscape will be transformed by significant demographic shifts, a multi-generational population, a lack of educational standardisation, and increasing cultural diversity. Technological breakthroughs, rapid urbanisation, changes in global economic influence, resource scarcity, and climate change are also shaping the picture up to 2030. Open models of development, open sourcing of ideas and solutions (e.g., crowd funding and collective intelligence), and open access to information tools are significant sources of progress that are gaining traction every day.[58]

Artificial Intelligence (A.I.) is a rapidly evolving technology that can radically alter jobs in the United States. Unlike previous technologies, A.I. implementations can be found in a wide range of highly-skilled, well-paid, and predominantly urban sectors, such as medicine, banking, and information technology. How can policymakers help policymakers promote the next generation of job opportunities, considering A.I.'s ability to change the nature of work? The complexity of economic structures and A.I.'s differential effect on different types of labour make it difficult to investigate this issue.[59]

Although technology usually enhances efficiency, A.I. can eliminate some of the most important employment opportunities today. Academics and politicians worldwide are therefore concerned about the future of work in advanced and emerging economies. In its economic

[58] Liudmila Alekseeva et al., "The Demand For AI Skills In The Labour Market", SSRN Electronic Journal, 2019, doi:10.2139/ssrn.3470610.

development strategy, China has, for example, made AI-driven technology the focus. Automation concerns are not new to A.I., and references to written language can be traced back to the dawn. Authors in ancient Greece anticipated that writing would replace human memory and read information with simple records. Historians refer to it as examples of technological progress that caused social unrest to the industrial revolution and the protests of the Luddites of the 19th century. Two recent examples illustrate these concerns.[60]

4.1. Impact of Artificial Intelligence (A.I.) on Labour:

Technologies improve the effectiveness of human labour, but significant developments can have a negative impact on jobs. Many people are worried about "technological unemployment" due to labour substitution, which motivates attempts to forecast A.I.'s effect on jobs. One research used a different methodology to conclude that 48 percent of current U.S. jobs are at high risk of automation. In contrast, another study used a different methodology to conclude that only 9% of employment is at risk. Similar studies in other countries have found that automation would affect 35 percent of employment in Finland, 59 percent of employment in Germany, and 45 to 60 percent of employment across Europe. Prospective studies have been criticised for lacking validity, but retrospective studies show that robotics reduces job opportunities in U.S. production.[61]

Technological advancements fuel economic development. Other variables, such as economic conditions, structures, and social conditions, are likely to affect the innovation, diffusion, and successful use of new technology. The introduction of labour-saving technologies during the first industrial revolution, for example, may have been influenced by the economic

[60] Ibid

conditions of the time. Furthermore, scientific theories have shown that work organisation habits differ across countries, even within businesses that use similar technologies.

While it is widely agreed that the first industrialisation resulted in improved living standards in society, especially for the working class, evidence suggests that these changes took time to manifest. The technological transition was related to shifts like work during the first industrial revolution: the mechanisation of textile production involved work shifting from artisans' homes to factories, from villages to cities, and from independent work frequently filling breaks in rural work to full-time, routine work in a hierarchical system.

While recent automation does not appear to have resulted in an overall decrease in jobs, it has resulted in low-skilled workers' income losses. Manufacturing job losses have generally been offset by increased jobs in services, resulting in total employment levels that are steady or rising. The literature reviewed in this review does not indicate whether aggregate statistics mask employment losses for particular populations or how new service jobs relate to lost manufacturing jobs in terms of prospects for advancement, stability, and working environment efficiency.

4.2. Theoretical Economic Models:

Recent economics theory seeks to provide a context for understanding A.I.'s influence on jobs, including both immediate, first-order effects and subsequent, second-order effects. The key conclusions drawn from this research are as follows:

- A variety of factors can compensate for initial labour demand declines as a result of automation. Increased market demand, increased investment, and innovation can contribute to increased labour demand as automation improves efficiency (resulting in

better or cheaper products). It is unclear if counterbalancing effects would be sufficient to counteract possible job losses due to automation in the short term. Transitions, even though they are, can be difficult. However, new jobs may potentially be produced in the same sectors that are automating.

- Longer-term, as manufacturing processes are reorganised, countervailing developments are likely to become greater, completely compensating the initial decrease in work required by companies that have introduced A.I. to automate production. Workers who have been directly displaced, on the other hand, may see a drop in their earnings as compared to other workers (and potentially in absolute terms). Unless the displaced population is mainly made up of low-wage workers, this will intensify inequality.
- Commodity and labour market productivity are crucial for enhancing job outcomes. The findings above generally assume that commodity and labour markets are dynamic, that is, that customers and employees can select between different goods and employers. That is not always the case, as some of the literature admits. Due to a lack of competitiveness in labour markets, productivity gains from automation will flow into higher income than higher wages. There is some fear that digital technologies would enable large corporations to expand and retain their market dominance. There is ongoing research in this area, but there is still a scarcity of data.

The models suggest automation can boost the standard of living for everyone, but in the short term, this is not always the case, and long-term inequality will increase as some workers benefit more than others. This is a change from earlier economic theory that all workers benefitted from technological innovation in a wide range of circumstances. It is important to note that the substantial element of such frameworks is the recognition of inflation's second-order

impacts, caused by price increases and the afore-mentioned 'productivity effects' as well as the impacts of 'market demand[62].

4.3. History of Technological Change:

This report summarises the results of selected scholars who wrote about industrial history before the 1980s. The bulk of these inventions is linked to Great Britain's first industrial revolution from 1780 to 1830. We are aiming at drawing key messages from the analysis of scientists who have written about historical lessons for the future of their work, the historical lessons on technological contributions to economic development, or whose results appear particularly important, on the basis of our analysis of the previous researchers and our interaction with researchers and politicians.

4.4. Role of Non-Technological Factors:

The author explores how incentive mechanisms influence innovative technology invention, diffusion, and successful usage. Technological development is regarded as a primary economic growth factor and change in living conditions in economic history and economics. However, other initial conditions can decide when technological progress occurs and leads to economic growth, such as:

4.4.1. Economic Circumstances:

Because of the high labour costs and low energy costs in 18th century England, labour-saving technology was developed and embraced, sparking the industrial revolution. Different forms of technology might have evolved under different economic circumstances, or the motivation to innovate might have been lower.

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[62] Anthony J. Rhem, "AI Ethics And Its Impact On Knowledge Management", *AI And Ethics* 1, no. 1 (2020): 33-37, doi:10.1007/s43681-020-00015-2.

4.4.2. Institutions:

Organisations that have implemented property laws and restrict the power of ruling classes have made technological progress possible, influencing new technologies, both innovation, and proliferation. The technological gains under those institutions would not be derived from the elite but would benefit society more widely than other **organisations**.

4.4.3. The Social Situation:

It has been proposed that the unusual circumstances that occurred in Europe after WWII contributed to labour relations or other types of government interference that could support high levels of technology adoption. It also cites research on human, cultural, and social changes that have resulted in increased information investment.

The ongoing debate about what explains industrialisation's timing and position, from which no consensus has emerged, is based on economic, institutional, and social circumstances. It adds to the debate by demonstrating that economic growth was a characteristic of history before the industrial revolution. Still, those periods of growth were often accompanied by periods of decline, effectively canceling out the benefits of growth. Then, from the 19th century onwards, advances in social development in Europe have been primarily due to a reduction in the duration of recession times rather than a rise in the frequency or strength of growth periods.

This is clarified by a large change in institutional structures, which is consistent with the proposed theory. According to them, pre-industrial societies were based on rules that defined the relationships between different groups. These laws were largely based on identity, with various responsibilities and rights being assigned to those that belonged to different classes. Institutions became tense as economic shocks occurred, altering the relative economic rankings of various

classes, which often resulted in confrontation and economic decline. This cycle could only be broken if organisations began to include "impersonal" rules, that is, rules that apply to all regardless of their position or membership of a specific community. The rise of the modern business company is stated in the study as an example of how western societies moved to impersonal laws. The first business companies emerged in the 16th century as contain additional to a certain community within the ruling class, often including monopolies over a specific task. General incorporation acts were only passed in the 19th century, and they "required a corporation to be established through a basic administrative act that did not involve express approval of a legislative or state body."[63]

4.5. Technological Change on Living Standards:

It was a significant question when the living standards of the working class started to rise after the industrial revolution. Several recent contributions to the debate about the effects of A.I. have asked if "this time will be different," i.e., whether there will be extensive changes in living conditions following the technological changes, without causing major job losses as in the past. Even though "this time" is not "otherwise" in connection with the technological changes of the AI, the effects on workers in the economy can still be cause for concern, particularly at the low end of the distribution of revenue. However, the literature on this topic presents conflicting conclusions to the best of our understanding. It is also noteworthy that a lack of changes in living standards in a period of population increase was a better result than in the past, in other words, a decrease in living standards similar to the mentioned ones.

The existence of evolving new kinds of work has been questioned further. There have been concerns that construction labour, including its reproductive work and structured discipline,

[63] Ibid

is morally unacceptable, contrary to this large variation of pre-industrial work. In it, too, the separation between home and work "was a "great source of anxieties" when people are concerned about the opposite phenomenon today.

4.6. Impact of A.I. on Employee's Earning:

Beyond any initial substitution effects that can lead to worker displacement or reallocation, the papers we reviewed are also useful in laying out the processes by which A.I. is supposed to affect jobs. The majority of the study contrasts how an original 'snapshot' of the economy compares to short- and long-term snapshots that include increased automation. The time it takes for the short and long runs to adapt is not always modeled. The following counterbalancing effects outweigh the negative impact on labour:

- Efficiency effects: Products and services become less expensive or better when production becomes more automated. As a result, customers require more products from the mechanical industry or other industries worldwide. As a consequence, labour demand is on the rise.
- New tasks are added as new product is introduced and demand rises. We will go into some of the latest activities that have been proposed in the literature. Between 1980 and 2000, the production of new tasks accounted for roughly half of all job growth in the United States.
- There is a wealth creation effect over time. Automation raises capital demand, but capital is fixed in the short term – it takes time to manufacture new machines and implement them if automation needs tangible capital, such as robots. This reduces the efficiency effect of automation. More computers can be manufactured and installed in the long run,

lowering the cost of capital and, as a result, the cost of production and increasing growth results.

In the short term, the supply curve can win out, putting workers at a disadvantage. The efficiency effect is still high enough to at least outweigh the substitution effect in the long run. In comparison to the pre-automation scenario, real wages rise. However, as a greater proportion of economic activity is industrialised, generated with little labour and little capital, the distribution of profits gained by workers relative to capital owners will decline. Even if everyone is better off as a result of automation, there are possible distributional problems.

The short-term impact of A.I., according to this report, is determined by the balance between replacement, efficiency, and the development of new tasks. Contrary to popular belief, more disruptive innovations could have a more positive impact on jobs than technologies that are only good enough to replace workers but not powerful enough to significantly increase productivity.

This debate contrasts inform actions with a current scenario that involves more automation, which lacks automation. Even if the counter-effects mentioned above are sufficiently large to compensate for displacement, unemployment can occur during the transitional period. New work can require skills or be distributed in remote areas compared to jobs that are decreased or modified due to automation. This refers to mental disorder in the US as a sign that the transition from agriculture to industry leads to unemployment. They argue that interference from the government made systemic change possible.

4.7. The Specific Groups of Workers:

Consumer reactions to productivity effects may have an impact on what happens to workers in particular industries.

Although automation is increasing, employment in these industries will increase if productive effects result in ample additional demand for the automation industry. It was the case for industries until one point – in the United States, for manufacturing before the 1930s, and for steel in the 1950s. Employments will need to move from automation to other economic sectors if demand in other sectors rises more rapidly. This tends to be the trend in the automation of industrial robots, which is linked to reductions in manufacturing jobs, at least partly compared with the increase in services.

According to the model, faster automation adoption does not necessarily mean that job losses in the modularising industry are more likely. The outcome is decided not only by technical capabilities and speed of acceptance but also by consumer reaction – though it is worth noting that consumer preferences in one country may have relatively little impact on global demand trends in a globalised world.

So far, the debate in this section has viewed employees as a single body. However, history reveals that technology has varying effects on various people. In particular, if technology replaces low-skilled workers' roles primarily, economic inequality will rise in the short and medium-haul, despite the above-mentioned compensatory mechanisms. It distinguishes between

two groups of workers, "low-skilled" and "high-skilled," and models automation that could replace workers in either group's tasks:[64]

4.7.1. In the short term:

When one group of employees is replaced by automation, the earnings of the displaced group drop; when unskilled jobs compete for employment with non-displaced workers, the earnings of the other community will also suffer.

4.7.2. In the long term:

As opposed to the no-automation baseline, average salaries rise. This is because, following the model, productivity effects outweigh displacement for one category of workers.

It implies that productivity gains benefit all employees equally, but this is not always the case; responses to productivity gains could disproportionately boost demand for goods made by an industry with a large proportion of low-skilled workers. Regardless, the group of employees who are directly displaced sees a drop in earnings compared to the other group, and possibly also in absolute terms.

4.8. Impactful Drivers of Artificial Intelligence (A.I.):

In the long run, technical advancement leads to higher wages for all jobs. These papers, on the other hand, explore how different expectations can lead to different outcomes.

First, if competition between producers is not enough, salaries are to decrease over the long term. To enhance productivity, workers need to be sufficiently competitive in their product markets, and employers need to decrease their market strength over their employees. Many

[64] Fang Wan and Chaoyang Song, "Flange-Based Hand-Eye Calibration Using A 3D Camera With High Resolution, Accuracy, And Frame Rate", *Frontiers In Robotics And AI* 7 (2020), doi:10.3389/frobt.2020.00065.

economies in recent years, which have raised concerns, have become less competitive. Recent studies have shown that the United States has recently increased its income, which is attributable to technology. The emergence of platform-specific economies dominated by one or more companies such as Face book and Uber in urban transport: the importance of large data sets in developing machine learning algorithms that can reduce market leadership level that smaller players can challenge. For example, Google's domination in Internet search can be difficult to challenge without accessing data from Google on previous searches by using a price-fixing algorithm, which can make it easier to enforce and detect collusion between rivals. In Section 4.4 of this study, we are examining selected information on the organisation of work on platform markets.[65]

The regulation of technology companies and the transformation of trade policies to meet the challenges raised by digitalisation are highly discussed issues outside the reach of this study. However, the evidence examined here indicates that policies aimed at reducing or minimising employer market power may help employees reap technological change benefits. Furthermore, A.I. has the potential to alter the product development:

The research so far has assumed a one-time rise in the number of job activities that are automated. If, on the other hand, implementing A.I. makes it easier to produce new automation, the effect of A.I. on jobs could be worse. In this situation, the above productivity effects still help sustain jobs and wages, but it is more likely that fewer people would work and that the share of income flowing to employees will decline in the long run. However, even in this case, a jobless future is not a foregone conclusion. Automation is taking over a growing proportion of job activities, and automated manufacturing industries are shrinking as a percentage of the economy.

[65] Ibid

This is in line with the long-term effects of technological advancement in agriculture, and to a lesser degree, manufacturing. Despite growing automation, the share of income that goes to labour remains constant as automated sectors shrink. Work is focused on non-automated industries, which have high prices compared to products produced in automated industries.

As previously mentioned, A.I. could increase inequality in the short term, even though all employees profit to the same degree, because capital owners will receive a greater share of income. It can also occur in the long run if production processes involve a fixed supply of input, such as property. Set input taxes may be a direct way to redistribute income, but this might not be ideal for other capital types. Another option for achieving redistribution is to reduce the number of rights given to innovators by Intellectual Property, such as reducing patent protection length.

4.10. Barrier towards Implication of Artificial Intelligence:

Flexibility, adaptability, openness to experience and risk perception are more important than ever in terms of the workforce's new skills and traits needed in the modern age. Additional training can be required to learn digital skills and achieve digital literacy. Leaders may pay for courses or recruit digital coaches or mentors to help them and others climb their learning curves faster and better and to tackle more complicated issues, as the author puts it.

This shifting reality in the digital age has several ramifications, the most critical of which is the legal system, which is rapidly becoming obsolete. The industrial era, which started in the early and mid-twentieth century and saw major companies organise their workforces into a series of internal labour markets, has come to an end. Since it is beyond the reach of this degree project, deeper analyses will not be conducted; however, there are essential consequences to

consider as we investigate conventional roles' transformation. Multiple agreements that violate norms essential to a human's survival are a good example. The issue of employee status is discussed, with the consensus being that contract workers' exclusion has become especially problematic.

Wage inequality can be a side effect of talent and knowledge. This is a cross-temporal issue that is being investigated in light of evolving reality. The Skill-Biased Technical Change (SBTC) theory implies that a burst of new technology increased demand for highly skilled jobs, which increased earnings inequality. They conclude that this theory fails to account for the development of the U.S. wage system in the 1980s and 1990s as a single-cause explanation. They accept that the rise in wage inequality tends to have been an episodic phenomenon starting in 2002, and they conclude that while some of the early increase in imports may have been due to rapid technological change, the spike in the early 1980s is primarily explained by more possible, although more boring causes. With this argument, we can deduce that technology does not affect employment, even though a technological transition is drastic.[66]

4.10.1. Infrequent Skills:

Forecasting AI-assisted automation necessitates capability data that keep up with rapidly evolving technology. On the other hand, standard labour data focuses on aggregate figures, such as salary and employment numbers, and lacks resolution into the nuances that differentiate various job titles and types of work. Previous studies, for example, have found a "hollowing" of middle-skill workers, which is characterised as an increase in the employment share of low- and high-skill jobs at the detriment of middle-skill occupations (Figure. 4A). Such studies use skills to describe labour patterns, but empirically they can only calculate annual wages rather than

skill

[66] Ibid

material. While wages can be linked to particular skills, wages alone do not capture the distinguishing characteristics, and models that focus solely on cognitive and physical labour may not account for technological change.

Data on academic qualifications is another tool for addressing job patterns. For example, jobs requiring a bachelor's degree can recognise cognitive employees who are less vulnerable to damage. Higher education institutions can, in theory, prepare workers to have useful skills that contribute to higher pay. However, concentrating solely on education and wages has proven insufficient to explain stagnant educational returns and slow wage growth amid increasing national productivity (Figure. 4B).

Enhanced data on qualifications needed for specific tasks could provide more insight than just wages and training. For example, previous investigations examined special kinds of skills related to technological increases and substitution or considered occupations as routine, cognitive, or physical or considered different types of skills relating to technology increases and substitutions. Increasing the specificity of the work model in job tasks and skills can help overcome work patterns and improve automation predictions supported by AI. Note that both high pay, cognitive and non-routine civil engineers and medical professionals require additional training and a professional qualification over the course of several years. On the other hand, these jobs require distinct, largely non-refundable professional skills and are likely to address a number of technologies. Wages, education, and even work complements may be too harsh to identify jobs, obscure the impact of various innovations and complicate projections of changing

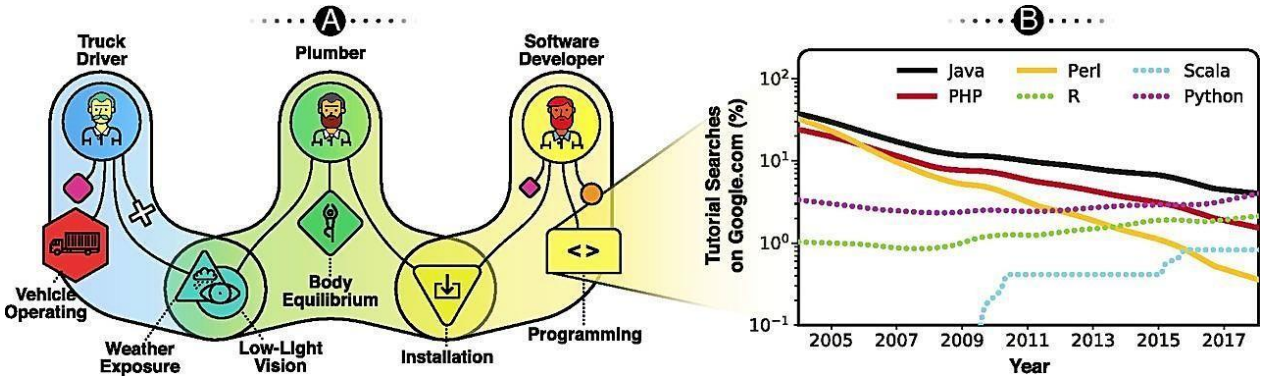
qualifications needs. Thus, the multiple systems that connect predictions allowing different viewpoints can explain these vulnerabilities.[67]

Despite the scarcity of publicly accessible skills data, the U.S. Department of Labour's O-NET database has recently been used in labour analysis. O-NET has a range of advantages, including a comprehensive skill taxonomy and more frequent updates than previous datasets. O-NET started receiving partial updates twice a year in 2014, which significantly improved the Dictionary of Occupational Titles. Job patterns and market changes for specific tasks and skills, on the other hand, can shift more rapidly than O-temporal NET's resolution and skill classification can capture. To make matters even more complicated, developments in A.I. and machine learning could be changing the essence of automation, affecting the types of activities that are impacted by technology.

In addition, studies often use O-NET information to create combinations of skills, such as knowledge input or mental processes, rather than focusing on skills at their greatest levels. In addition to methodological choices, the static taxonomy of NET has its collection of problems relatively well. O-NET says that both software developers and plumbers attach equal value to the "installation" skill. Nevertheless, employees in these jobs certainly do very various tasks while installing things on the job. Any static classification of the skills of the workplace is generally not appropriate for a changing economy: Because both mathematics and coding are computer-based, should they be treated at work separately? Is "programming," on the other hand, a term that encompasses a wide range of coding and hardware languages? Given the rapid growth of A.I. and machine learning, it may be more fitting to define programming tasks or specialised

[67] Ibid

programming languages. The correct abstraction is the most likely scenario, but O-NET data have a limited amount of versatility.



(Figure 4A & 4B) see footnote 68.

The micro-scale effect of A.I. and other labour systems innovations can be better understood with granular skills data. For example, recent patent specifications will indicate that certain forms of labour will be automatable in the near future, elucidating the effect of technological change on the specificity of work environment tasks and skills. Within occupations and throughout a person's career, the allocation of skill categories will show how occupational skill requirements change. Consider how the skill specifications in job listings for occupations like software developers are dynamically modified to reflect the tools and needed specialisation at the time. Despite the competitive nature of employment, understanding the complexities of individual skills coupled with the wages within professions will capture the marginal benefit of various skills.

Untraditional and emerging data sources have opened up new scientific opportunities like online work platforms. These sites collect information on the dynamics of work in specific industries in real-time. Resume data will help us understand training and employment better and recognise changes in the working environment between employees and skills. Employment

postings often demonstrate increased demand for specific skills and capture changes for work. When combining these different sides of the data, they give a granular adaptive view about the changing nature of work, revealing labour disconnections. At this time, access to these private data sources is restricted, and a data-sharing arrangement is usually needed that protects personal and other confidential information. Of course, these data are inherent in individual and representative sample privacy, but extensive access can complement available details about jobs and workplace skills currently available considerably. A safe environment can exchange comprehensive know-how and career data, like the recently announced collaboration of the Social Science One.

4.10.2. Limited Flexibility:

Biblical technology-driven trends do not accurately represent today's AI-driven trends. As a consequence, some people assume A.I. is a completely new technology. How will policymakers sustain and build jobs and opportunities in the face of A.I. if past employment patterns are not predictive of current or potential employment trends? What characteristics of a labour market contribute to labour's generalised resistance to technological change?

Because of the uncertainty surrounding technology's effect on jobs, it is difficult to build resilient labour markets. Designing viable job retraining programs, for example, necessitates in-depth awareness of the local workforce, experience with current technologies, and an appreciation of the global labour market's dynamic interdependencies. As a result of technology's ability to perform specific tasks, the demand for specific workplace skills can change. Occupational ability redefinition, workplace redistribution (e.g., job growth and technical unemployment), and spatial redistribution are all examples of micro-scale shifts in skill demand

that can aggregate into structural labour patterns (e.g., employee migration). Forecasting these complicated effects necessitates a thorough understanding of the paths that these dynamics take.

Consider the rivalry between human cashiers and automated teller machines as an example of these complexities (ATMs). Surprisingly, the introduction of ATMs resulted in an increase in national jobs for bank tellers. The supply curve is one explanation: More bank branches developed nationwide to meet increasing customer demand as ATMs reduced the operational costs of bank branches. Another explanation is the accompanying change in fundamental skill requirements from clerical capacity to social and persuasive abilities used by salesmen and customer service representatives. Only by linking job-level shifts in educational attainment composition with system-level demand dynamics brought on by increased productivity can the story of bank tellers and ATMs be completely told. As a result, a revised paradigm for labour and A.I. must identify the interactions of micro workplace skills in combination to create macroscopic labour patterns, such as task polarisations, employment transitions, and workers' spatial mobility.[68]

The current theory of the job-seeker-to-job-vacancy matching process offers a stylised overview of the process that lacks resolve into skill demand. By defining which types of work and locations can experience augmentation and/or replacement with new technology, mapping the area of skill interdependencies may inform training, and job support is offered. Individual workers' job mobility is determined by the precise skill requirements of occupations, and shifts in demand for specific skills have the potential to reshape viable respective careers and worker flow

[68] Shilpa Verma, G. T. Thampi and Madhuri Rao, "ANN Based Method For Improving Gold Price Forecasting Accuracy Through Modified Gradient Descent Methods", *IAES International Journal Of Artificial Intelligence (IJ-AI)* 9, no. 1 (2020): 46, doi:10.11591/ijai.v9.i1.pp46-57.

among occupations. In the face of technological change, mapping the relationships between workers and skills that create work opportunities is a crucial move for policymakers.

Network science methods have also given new insights into modeling (and minimising) structural risk in the global credit and financial sectors, predicting future exports of national economies, mapping workforce movements between industries and businesses, and charting the evolving industrial makeup of cities and municipalities among other domains. As a result, understanding the mechanisms by which labour dynamics take place could provide similar insights into the effect of A.I. on labour. Ecological resilience has been measured using similar approaches focused on the structure of mutualism interspecies interactions. These approaches often use the density of connected organisations to estimate structural resistance to species extinction, which is similar to declining demand for ability as new technology is introduced.

For mapping skill dependencies, reasonable data-handling methods are required. As data must reflect the complex nature of skill representation of the superior skills, the skills demands must also be adapted to detect, categorise and quantify. Ironically, techniques based on AI can be helpful. Machine-powered learning tools can capture the linear function in complex, high-dimensional data to suit the proposed and other econometric applications. For example, NLP can translate information on historical skills from the Shown Dictionary in an O-NET format. Machine learning can be used based on longitudinal job reporting data to detect qualification requests, including a new page in technological capabilities. By bringing these state-of-the-art statistical methods together with relevant information, scientists can gain new insights into high-

resolution work dynamics. With this technological advance, workers' ability to react to real-time working patterns and policymakers would rise.[69]

4.10.3. Geographical Separation:

The effect of A.I. and automation will differ greatly depending on region, with consequences for the labour force, urban-rural inequalities, and income distribution shifts. The focus of A.I. and automation research is primarily on national job patterns and wealth disparities. Recent research, on the other hand, shows that some areas are more vulnerable to changes in technology than others. Professions form a web of interdependencies that limit the ease with which jobs can be automated. As a result, the overall labour market's health may be influenced by the effect of technology on individual urban and rural labour markets.

Despite the fact that technological change affects access to specific workplace knowledge and responsibilities, existing skills data obscure the specific skill sets that makeup and distinguish the workforces of various geographies. This is due in part to the fact that data from national surveys, including the O-NET database, balance out regional differences in the requisite skills of employees with similar job titles. Software developers seeking work in Silicon Valley, for example, may need to advertise more diverse skill sets than employees in a tighter labour market. Exacerbating the trend, A.I. innovations that supplement high-wage cognitive jobs are more prevalent in large cities, while physical low-wage activities that are more easily replaced by robots are more prevalent in small towns and rural communities. This finding implies that national wealth disparities are mirrored in wealth disparities between large and small cities, similar to wage disparities between individuals.

[69] Ibid

More granulated skills data (mentioned above) and unique ideas into the processes that generate today's cross-sectional regional patterns are needed for improved models of spatial interdependencies.

Besides that, just as internal connectivity dictates urban economic resilience, so do intercity links that underpin the national economy's economic health. A disruption in the supply chain of very well cognitive workers, for example, may suffocate an urban economy that attracts skilled workers. As a result, policymakers should be mindful of the relations between their local labour market and other urban labour markets in order to evaluate the economy's resilience. Identifying the constituent skill sets in cities will inform models for worker spatial mobility and enhance our understanding of career development and rewards, as employment prospects are key in people's decision to migrate, and skill matching is important to the job matching process.

4.11. Impact on Physical Skills:

Human capacity is enhanced as human habits of eons-old years are disrupted by digital life. Code-driven systems have reached more than half of the world's population with unimaginable opportunities and threats in environmental knowledge and communication. Specialists believe that artificial intelligence interconnected can enhance human productivity as well as undermine human control, agency, and capacity. They talked about computing in areas like the critical decision, reasoning, learning, advanced analytics, and data modeling, acuity of vision, voice recognition, and language translation, which could even overcome and equal human intelligence and skills. They claim that 'smart' systems can save time, money, and lives in

cities, cars, buildings and infrastructure, fields, and business processes, as well as offer individuals the opportunity for a personalised future.[70]

Many of the hopeful remarks centered on health care and the many potential uses of A.I. in diagnosing and treating patients, as well as assisting senior citizens in living fuller and healthier lives. They were also excited about A.I.'s position in large public-health projects focused on vast quantities of data about everything from private genomes to nutrition that could be captured in the coming years. A number of these experts have projected that A.I. will help to facilitate long-awaited improvements in public and private education systems.

Nonetheless, most analysts, whether positive or pessimistic, expressed reservations about the long-term effect of these emerging tools on fundamental human characteristics. In this non-scientific poll, all respondents were asked to explain whether they believed A.I. would benefit people or not. Many people expressed deep concerns and offered suggestions about how to address them. The accompanying table summarises the key themes they heard about risks and remedies.

Our own correspondence will be strongly augmented, adding to the ambiguity: Many of our messages will be written by programs, and our online/A.R. presence will be generated computationally. Bots can greatly outperform humans in the ability to attract and convince us, thanks to their access to large troves of data about each of us. They'll never be overwhelmed by emotions because they can expertly imitate emotion: If they scream something in frustration, it's because that action was determined to be the most successful way of achieving whatever objectives they had "in mind." But what are these objectives? Artificially intelligent partners will

[70] Shilpa Verma, G. T. Thampi and Madhuri Rao, "ANN Based Method For Improving Gold Price Forecasting Accuracy Through Modified Gradient Descent Methods", *IAES International Journal Of Artificial Intelligence (IJ-AI)* 9, no. 1 (2020): 46, doi:10.11591/ijai.v9.i1.pp46-57.

give the impression that they are motivated by similar social aspirations to our own – to be respected, whether as a cherished friend, an esteemed manager, or otherwise. Their true cooperation, however, will be with the people and entities in charge of them. These would, as their forefathers, be used by sellers of products to promote demand and by politicians to influence public opinion.

The existing social safety net systems in New Zealand, as well as many other nations around the globe, were not designed for our transition to A.I. The A.I. transformation will take at least the next 50 years. When we progress forward into the third age of computing, and as A.I. systems become more deeply embedded in every sector, we will need novel turbo-skilled professionals who can perform jobs that have never existed before. Farmers who know how to operate with large data sets will be needed. Roboticists are oncologists who have received special training. Electrical engineers were taught by biologists. With a few adjustments to the program, we will not have to train our employees just once. We will need a versatile workforce as A.I. grows, worthy of adaptation to changing processes, technologies, and resources every few years. These fields will be in high demand sooner than our labour departments, colleges, and universities anticipate. It's all too easy to see history through the prism of the present, blind to the social turmoil brought on by growing mass innovation. We must face a daunting fact that few are willing to admit: A.I. will ultimately bring a significant number of people out of work permanently. The rapid pace of technology would likely mean that Younger Generations and the oldest members of Gen X, particularly those whose jobs can be replaced by robots, would be

unable to retrain for other types of work without a substantial expenditure of time and effort, just as previous generations witnessed dramatic changes during and after the Industrial Revolution.[71]

Summary:

A.I. is able to transform the requirements of skills, jobs, and the distribution of workers via industries and jobs in the U.S. and other developed and developing countries. On the one hand, researchers and politicians, as a result of specific cognitive innovations, such as AI, are ill-equipped to predict patterns of work. Technology is usually developed to do a specific job that changes the need for specific job skills. The changes in demand for skills affect the requirements of professional skills, job mobility, and social welfare across the entire economy. The identification of fundamental ways of these dynamics was made difficult by the tough historical data and resilience modeling methods. However, by giving priority to extensive data collection, which is sensitive to real-time changes in the labour market and takes into account regional variability, we are able to address those challenges. The improved access to unorganised data from the summaries and job listings and new indicators for recent technological change and model changes for both commuter liner systems and intercity work dependencies will provide new and promising strategies for understanding and predicting the future of work. This enhanced data collectability would better serve to represent the complexity of labour systems through new data-driven tools, such as machine learning and structural modeling. New data will help to improve our understanding of how technology affects modern labour markets.

[71] Ibid

CHAPTER 05:

The Employment of AI Technologies

In order to see the lessons learned in this article, we will look at the technical applications of artificial intelligence, their forms, and understandings at a cold-face level. We look at the much recent publication in the first part of the paper that shows AI can stimulate growth in product and idea production by replacing work with capital. In combination with inefficient competition policies, however, AI can stifle progress. The second part examines the impact of robotic activity on employment in New Zealand between 1994 and 2014. Firstly, we demonstrate that robotics reduces aggregate workplaces in the workplace; secondly, no qualified workers will be much harder to use than educated people based on empirical analyses of French results. These findings showed that insufficient employment and education policies restrict the positive effects of IA and job automation.[72]

The ability of a mechanism to imitate intelligent manual behavior is usually described as artificial intelligence (AI). Indeed, as a result of the automation of previously work-intensive activities, our economies undertook several technological developments since 1820. In the early 18th century, the steam-motor revolution began, following in the early 20th, the internal combustion revolution, and in the 1970s and 1980s, the semiconductor and IT revolutions. But AI continues to automate features that we previously considered unable to automate, as the movement of a vehicle, medical advice, and chess. The answer would seem today if anyone could ask what the impact of AI should be for growth and jobs: AI is good for growth as it improves efficiency, but it is bad for jobs because it replaces work with machinery. In this

survey, however, we will argue that the world is more complex and that AI's influence on growth and jobs depends heavily on the institutional and political context.[73]

AI will boost growth by replacing finite-supply labour with unbounded-supply capital in the production of goods, as well as in the production of ideas. However, we will discuss recent research that suggests that when AI is combined with ineffective institutions, particularly an ineffective competition policy, it can stifle development. We would also argue that Artificial intelligence does not always have a negative effect on jobs. First, the overall effect of automation on skilled labour tends to be positive. Second, those plants that automate end up creating more jobs, implying that labour market frictions are at the root of any negative association between technology and aggregate employment. This stresses the relevance of education and labour market policies in assessing the effects of automation on total jobs.

This may explain why, after a burst of development between 1995 and 2007, in the aftermath of the IT revolution, productivity growth in the United States has been declining steadily since 2007. Furthermore, it explains why the average markup in the United States has risen dramatically over the last decade, and why this is primarily due to methods based: namely, the share of greater firms in the economy has increased, but markups within firms have not.

This description demonstrates how technological revolutions such as IT or AI can have negative effects on economic growth if the proper institutions are not in place. Indeed, the combination of the IT revolution and the lack of acceptable competition rules has allowed super-star firms to grow indefinitely, discouraging non-super-star firms from innovating and entering the market. Here, we're thinking about the lack of M&A legislation and the fact that super-star

companies are not obligated to share their data performance with other companies. The job then becomes rethinking market policy in order for the IT and AI revolutions to completely deliver on their growth commitments.[74]

5.1. Automation, Artificial Intelligence (AI), and Employment:

Since AI is still in its infancy, analytical work data is not yet available. As a consequence, it is currently difficult to give a serious message about AI's future effect on jobs. As a result, empirical research has centered on automation in general and its effect on jobs. Several negative effects of automation have been identified:

An increasing wage gap due to higher returns on production and ongoing jobs disappears because of automation; an increase in joblessness: technological employment rises under the labour market: fewer qualified workers are forced to accept lower qualified jobs, whilst unqualified workers may be cast out of the labour market; It reflects on the structural change of the labour market: low-wage services, less vulnerable to automation, will replace manufacturers with medium-income workers.

It's critical to get a precise measure of automation, which is what recent studies have attempted to do. Earlier research focused on computer or information technology (IT) as a measure of automation, while more recent papers look at other variables such as automation-related patents or the number of robots. The evidence on the effect of robots on net jobs is mixed. It claims that adding one more robot per thousand jobs lowers job rates by 0.17–0.21 percentage points in six EU countries. Another study found that automation has little impact on overall jobs. Robots result in overall job losses, but they have a particularly negative impact on manufacturing

[74] Ibid

employment: each additional robot per thousand employees decreases the total manufacturing jobs ratio by 0.0561 percentage points.[75]

5.2. Types of Artificial Intelligence:

For our purposes, we will use the concept of AI as "any system that perceives its world and takes actions that increase its chances of successfully achieving its goals." Furthermore, these machines are capable of simulating human abilities such as interaction, learning, and problem solving. The devices employ a set of interconnected technologies that enable them to solve problems and carry out tasks on their own, without the need for human intervention. Machine learning is a branch of artificial intelligence. Other areas of AI, such as Natural Language and computer vision, depend heavily on machine learning. These four forms of artificial intelligence are subsets of the larger field of artificial intelligence:[76]

5.2.1. Reactive Machine:

The most basic form of AI system is reactive machines. This means they cannot remember anything or use previous experiences to affect present-day decisions; they can only respond to what's going on around them – hence the term "reactive." Deep Blue, IBM's chess-playing computing system from the mid-80s, is an example of a reactive system. Deep Blue was designed to play chess against a human opponent with the aim of defeating the human opponent. It was designed to recognise a chess board and its components while also comprehending their functions. Deep Blue was able to predict what moves it should make as well as what moves its opponent would make, improving its ability to predict, pick, and win.

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[75] Ibid

[76] Dodam Jang and Myeoun-Heum Yeoun, "A Proposal Of AI Service Scenarios For The Development Of AI Service Agent In The Near Future Public Space ; Based On AI Service Agent Types", *Journal Of Industrial Design Studies* 52 (2020): 105-116, doi:10.37254/ids.2020.06.52.09.105.

Deep Blue beat Russian chess Garry Kasparov in a series of games between 1996 and 1997, becoming the first computerised program to defeat a human opponent. Deep Blue's unique ability to play chess matches correctly and effectively shows its reactivity. In a similar vein, the reactive mind suggests that it has no knowledge of the past or future; it only comprehends and acts on the universe and its components as it exists now. Reactive machines are able for the here and now, not the before and after, to keep things simple.

Reactive machines have no knowledge of the outside world and, as a result, can only perform the tasks for which they were designed. Reactive machines have the property of always behaving the way they were designed, regardless of the time or place. With reactive machines, there is no development, just stagnation in repeated acts and behaviors. The most simple AI systems are solely reactive, with little ability to shape memories or use previous experiences to direct current decisions. Deep Blue, IBM's chess-playing supercomputer, is the ideal example of this form of system, having defeated international.

The machine perceives the environment explicitly and acts on what it sees in this form of intelligence. It does not depend on an internalised worldview. Rodney Brooks, an AI academic, argued in a seminal paper that we could only create machines like this. People are not very good at programming realistic artificial worlds for machines to use, which is referred to as a "representation" of the world in AI scholarship. Present intelligent machines either have no such definition of the universe or have one that is very small and specialised for their specific tasks. Deep Blue's design breakthrough was not to extend the number of movies that the machine might consider. Rather, the designers figured out a way to narrow their attention, choosing to abandon some possible future moves based on how they worked. Deep Blue might have needed to be a much more powerful machine if it did not have this ability to defeat Kasparov. Similarly,

AlphaGo, which has defeated top human Go experts, is unable to predict all possible future movements. It uses a neural net to test game creations, which is more advanced than Deep Blue's.

These strategies help AI systems perform better in specific games, but they cannot be easily modified or applied to other circumstances. These computerised imaginations have no understanding of the outside world, which means they cannot work outside of the tasks they are given and are easily deceived. They cannot communicate with the world the way we imagine AI systems doing in the future. Instead, these devices will respond in the same way each time they come across a similar situation. This is a good way to ensure that an AI system is reliable: You want your self-driving car to be a healthy driver. However, if we want computers to actually interact with and react to the environment, this is a bad idea. These basic AI systems will never be bored, interested, or depressed.

5.2.2. Limited Memory:

In this category, Type II machines will look back over time. Cars that self-drive do some of it already. For instance, they keep track of other vehicles' speed and direction. This cannot be done in a single moment. It involves recognising and tracking individual objects with time. These findings are applied to the preprogrammed world pictures of self-driving cars, including lane markers, lighting, and other key elements such as road curves. It is used whenever the car chooses to switch lanes to avoid further cutting or being hit by a passing car[77].

However, these basic tidbits of historical knowledge are only temporary. They are not saved in the car's knowledge book, as drivers do behind the wheel for years. How can we build AI structures that generate full representation, recall past experiences, and learn how to deal with

new situations? Brooks was right that it is unbelievably difficult to do so. My research in Darwinian methods inspired by development suggests that machines can create one's images to offset human weaknesses.

Machine learning models with limited memory derive knowledge from previously learned material, stored data, or events. Unlike reactive computers, limited memory creates experiential awareness by witnessing behavior or data fed to them in the past. While limited memory is built on observational data and pre-programmed data already present in the computers, these sample bits of information are transient. Autonomous vehicles are a form of memory space that already exists. Self-driving cars, or autonomous vehicles, operate on the concept of limited memory, relying on a mixture of perceptual and pre-programmed experiences. Self-driving cars read their surroundings, detect trends or changes in external factors, and adapt as required to perceive and analyse how to properly operate and function among living organism vehicles.[78]

Autonomous vehicles track not only their surroundings but also the presence of other cars and drivers in their line of sight. Driverless cars with limited memory AI used to take up to 100 seconds to respond and make decisions based on external factors. The importance of limited memory AI can be seen in the reduction in reaction time on device observations since its implementation.

This could be called the critical line between the machines we now have and the machines we will build in the future. But when discussing the types of display machines that must form and those representations' material, it is preferable to be more precise. The next, more

advanced machine class represents the universe and other agencies or entities within it. In psychological science, people, animals, and objects in the world may understand and have thoughts and feelings influencing their actions.

Since they enabled us to have social experiences, this is critical to how we humans developed societies. Working together is at best challenging, at worst impossible, if we do not understand each other's motivations and motives, and if we do not realise what others feel about me or the setting. If AI systems are ever to walk among us, they must be able to comprehend that we all have ideas, emotions, and perceptions of how we will be handled. They'll have to change their actions as a result.

5.2.3. Theory of Mind:

Theory of mind refers to a machine's decision-making capacity that is equivalent to that of a human mind. Although several computers now have human-like abilities (voice assistants, for example), none are completely capable of having human-like conversations. Emotional ability, or sounding and behaving as a person does in traditional conversational norms, is one aspect of human communication.

Recognising that people have emotions and thoughts that affect behavioral performance and therefore influence a "theory of mind" machine's thought process would be part of this future class of machine capacity. Since social interaction is such an important aspect of human interaction, the AI systems that regulate the now-hypothetical machines will have to be able to recognise, understand, remember, and react to emotional performance and behaviors in addition to making the theory of mind machines a reality.

Therefore, this theory of mind machines should be able to use and integrate knowledge gained from humans in their learning centers to understand how different circumstances are to be handled and dealt with. Theory of mind is a highly advanced type of machine learning that will necessitate machines to fully recognise the rapid change in human emotional and behavioral patterns and understand that human conduct is flux. Kismet was able to identify and replicate human facial signals with its facial features, such as the eyes, mouth, ears, lips, and eyelashes.

5.2.4. The Self-Awareness:

The final phase of the AI creation is the building systems that can form representations for themselves. Finally, we IA investigators would not only have to understand consciousness, but we would also have to build the machines. The AI is self-aware of machinery with human-level awareness. There is no such AI at this time, but it is the most sophisticated artificial intelligence ever developed by man. Self-aware AI has the ability to think for itself, have desires, and recognise its emotions, in addition to understanding and replicating humanlike behavior. In essence, self-aware AI is a creation and expansion of the theory of mind AI. Self-aware AI takes things a step further by suggesting it can and will have self-guided perceptions and responses, while the theory of mind only emphasizes the aspects of understanding and repetition of human activities.

In some ways, this is an extension of "the theory of mind" of Type III. Consciousness is also called "self-awareness" for a purpose. A conscious being is conscious of it, is aware of its inner conditions, and can foresee others' feelings. We think that someone behind us in traffic is both frustrated and impatient since we believe the same way as we honk someone. Without even a theory of mind, we could not make such inferences. Even if we are certainly far from self-knowledge, our efforts should be focused on the absorption of the body, learning, and decision-

making based on previous perceptions. This is a critical step towards the self-understanding of human intelligence. It is essential to develop or establish machines that classify what they see better than average.

5.3. Lesson Learned by Artificial Intelligence (AI):

Advances in AI capabilities, combined with big data, have brought the benefits and challenges of AI into sharper focus in recent years. As a result of these changes, a surge in the publication of AI ethics standards and recommendations from civil society organisations, research centers, private businesses, and government agencies, as these groups made their commitments public and placed themselves on the most relevant values to embed in the creation and implementation of AI goods.

Artificial intelligence (AI) is increasingly transforming virtually all aspects of how we live our lives, and our professional lives are no exception. Even those of us who do not work for tech companies (though as every company aims to become a tech company, it will become a smaller percentage of the population) will soon notice AI-enabled machines in our everyday lives. Every technical task should add value to the company. If you're doing research, you must always be able to give an example of a real-life case you're working on. If you cannot quantify a situation, there's usually no point in spending time on it.

Here's a rundown of some of the AI-related lessons that businesses should learn right now and which are likely to be rapidly followed by those looking to capitalise on the advent of smart machines.

Before embarking on an AI project, you must first ask yourself, "What is the intention of your team?" We began with two primary goals before launching our AI initiative: I to assist the

company in providing AI-powered products to clients, and ii) to simplify and transform information work. The first goal keeps us focused on building market value, while the second serves as a compass to keep us on track, so we do not get sidetracked by small improvements and one-off ventures. Many business functions are data-driven by nature. Any heavy industry where measurements and forecasts are part of day-to-day work is a great fit for AI. My work has taught me that AI can and should be used in any business activity, from HR to supply chain to legal.

5.3.1. Hiring & Recruitment:

Soon it could be a fact that AI-enabled machines have played a role in making sure that we are the right person before we go to a new office. AI pre-screening of applicants is becoming ever more popular in large companies that employ thousands of people each year and often attract millions of applicants until they are invited to participate in interviews.

It offers resources for test candidates invited to interview with a set of games centered on neuroscience concepts. It assesses the candidate's cognitive and emotional characteristics while ignoring gender, economic or racial demographic damage. This can be accomplished by contrasting applicants' performance to that of current employees who excel at their positions. When it decides that it is not well suited to the role, it will identify an additional role for which it would be best suited and suggest instead that it apply.

Another agency providing these services, Montage, says that 100 of the Fortune 500 companies used their AI-driven interview platform. It enables companies to conduct text interviews on demand, automate scheduling, and decrease implicit bias in the recruitment process. When it comes to log in, AI-enabled chat bots are the latest way to help new employees get into their positions and learn about enterprises' various aspects. Unilever, a global consumer goods corporation, uses Unabot, a natural language (NLP) Chabot, to answer employees'

questions in a simple, human language. There are tips on everything from where to take a morning shuttle to handle problems with HR and payroll.

5.3.2. Training & Development:

Surprisingly, we still do not do a decent job with reinforcement training. However, learning retention is dependent on reinforcing the learning during a training case. This is where AI and machine learning will make significant progress where people have fallen short. We do not take the time to reinforce what we've learned, but machines do! This is already being offered by intelligent software and systems on the market. Intelligent systems can involve us and help reinforce preparation, helping to make learning “stick” and increasing increased learning success as a result, just like they can remind us to take our vitamins.

Learning does not stop until you have moved to your new position, of course, and AI is likely to play a role in continuous training for most employees in the future. It will also help transition expertise from one era to the next – when employees move to other businesses or retire, it will help them keep going and take with them the valuable experience they have gained. It has developed tools that combine augmented reality and artificial intelligence (AI) to collect work experiences and learn lessons transferred to new employers.

Employees use headsets for their everyday tasks using virtual reality. They use image processing technology to record what the engineer does, which can then be played back, allowing trainees and new employees to see the work virtually. The video imagery is also used to build AR tools that provide engineers with real-time feedback while working, such as alerting them to risk or reminding them to perform routine tasks in a particular location or looking at a specific item.

5.3.3. System Integration:

Integration is not a big deal in and of itself. But do not forget to account for human experience. If the organisation already has a rule-based framework in place that makes decisions and is well-understood, a new solution based on machine learning techniques appears to stakeholders as a black box. As a consequence, providing a consistent migration strategy that identifies possible risks is important. We collaborated with a business travel agency that, among other things, bought plane tickets for its customers. The booking process took 12 hours, during which period the price could change. Many factors influence fluctuation, including passenger traffic, day of the week, time of day, season, major sporting or cultural events, weather, and so on. The aim was to show that by analysing historical data and applying machine learning techniques, prices could be reduced by several percent on top of the current price reductions achieved by an old but validated rule-based method.

However, no one wants to depend on a black box with a one-billion-dollar turnover. A migration strategy was devised: first, an ML-based indicator was installed in parallel with the production environment, accompanied by the processing of 10% of transactions in production, then 30%, with relative performance being continuously monitored. When the system is proved in development, at least 10% of the passes will need to be bought using the old rule-based algorithm in order to get the most recent changes of the sales engine and stop the ML system from fitting its state when it feels it knows something about the world around it. It's important to show all stakeholders that the machine learning process is incremental and reversible in the event of failure.

5.3.4. Be Creative:

There's always a complicated and precise way to solve problems that involve a lot of data wrangling, such as function engineering, which requires days of manual labour. But can you

keep it easy and get 80% of the outcome with just 20% of the effort? On top of info, we've learned to use lateral thinking. In one scenario, we had to identify processes in a large chemical corporation by business units. Using publicly accessible NLP templates, we converted the method and division phrases to vectors and sought the closest pairs as a solution to manual input.

We once had to go through 20 years' worth of advertising material with Mastercard logos to see which ones were still relevant. There are tens of millions of documents in this collection. We came to the conclusion that Mastercard's last logo update was in 2016. After two hours of labeling and training the cloud-based image processing service, we were left with only new documents.

5.3.5. Manage Extensions:

New technology, such as machine learning, brings with it a range of problems that older technology does not. One of the most challenging problems with modern technology like machine learning is ensuring that suggested measures do not frustrate management due to the inherent complexity. For the majority of people, machine learning and data science remain a black box, which is why managing expectations is more critical than ever. Remember to inform people, measure research findings in order to compare them to the objectives, and plan ahead for incorporation from both a technological and a human standpoint.

A mixture of AI, heuristic methods, and manual routine is fine where necessary. When people begin designing an AI-based solution, they often plan to construct something fully automated — a fully automated oracle with all the bells and buzzers that can make suggestions with utter certainty. You're fortunate if this is possible, but keep in mind that even if machine learning does not fully solve the problem, it can be extremely useful in preparing the data needed

to make a decision. Taking the ultimate ruling away from ML helps to avoid industry mistrust since most experts prefer a human being to make the final decision.

Organisations have also struggled with estimation. We would have no excuses with AI. Intelligent systems would be able to search vast amounts of data rapidly and efficiently, pulling information from a variety of sources, not just online tests and course surveys. AI would be able to help us adjust training programs based on progress and failure points by correlating on-the-job behavior in various current processes with training programs and also by comparing employee profiles to build "buddy systems" and mentorships. This would enhance the learning environment over time, enabling staff and coaches to concentrate on learning that yields results.

5.3.6. More Effective Learning:

The benefits of a more personalised learning experience have been touted by the learning industry for years. This is now possible thanks to AI. The learner will benefit from more adaptation and tailoring of their unique needs and preferences thanks to back-end machine learning provided by voice recognition and more intuitive user interfaces.

Computers can analyses data behind the scenes and provide real-time input during a training session, allowing a course direction to be modified based on success and reaction. Tests and quizzes will intelligently respond to the learner's inputs and propose a customised curriculum course—the learner benefits from a more effective and customised experience. Imagine not needing to sit through a five-day class if the learner just needs a portion of it.

5.3.7. Identifying Problem:

While it would be advantageous to use AI in all departments for the smallest effect, clients would not choose any AI solution that might help them. Time, budget, and reality constraints are the primary reasons. Clients must select the region where the solution would have

the greatest effect, a budget must be identified, and an urgent fire must be extinguished. Finding a solution to a dilemma like this requires time. In order to discover these possibilities quicker and more effectively, my company found it important to build Restudy, Design Sprint, and PoC-like frameworks. It's difficult to know where to begin and what is possible. In my opinion, designing business-driven AI solutions is just as difficult as making the model correct.

You can theoretically solve incredibly complex problems with anything as effective as machine learning. We believe that technologies can assist us in improving in areas such as climate change. It does not mean we should stop doing anything else we're doing as consumers, such as cutting flight times and recycling, or as companies, but as history has shown, making things more sustainable can save incredible amounts of energy. One of the reasons I joined an AI organisation and why many people are so enthusiastic about AI is because of this strength.

Because of this tremendous strength, it is important to ensure that AI efforts are ethically sound. The amount of realistic-looking fake videos you can make to help your propaganda and brainwash even the most intelligent people is terrifying. However, AI can be used to counteract this scam by putting in metadata about online images and videos that would otherwise be difficult to interpret as false.

5.4. Artificial Intelligence in Action:

The ethics of AI and the consequences of AI-powered goods and services are receiving increased attention Meta-analyses were published in 2018 and 2019. In our everyday lives, now artificial intelligence (AI) is prevalent. Now, because of the fact that a range of AI researchers, academics, and research journalists have demonstrated biased and/or non-ethic algorithms and their consequences, we recognise the value of AI governance and demand reform, as well as increased transparency and accountability. "Stop treating AI as sorcery and take responsibility

for its ethical development, execution, and administration," questioned the AI ethics area. The ethics standards of many organisations, despite the lip service paid to these concerns, remain ambiguous and difficult to enforce. The demand for a change to practice is growing louder in view of the highest-profile cases of face recognition, AI in health care, misinformation on social media sites, and partial algorithms used to detect eligibility of benefits or fraud, to name a few. Scholars, advocates, and ethical journalists working in this field believe that decisive action is needed before further harm is done to people and society and prior to undermining public confidence in what is now known as AI or algorithms.[79]

In this vein, future discussion and movement toward practices and democracy should include a focus on big companies' business and labour practices, company culture and benefits, and the social, racial, fiscal, and ecological impact of their technologies. The unprecedented capacity of AI algorithms to rapidly absorb, propagate, and legitimise types of prejudice and damage is a major improvement over previous technologies, necessitating a rigorous analysis of these methods to ensure ethical and socially beneficial usage. Efforts to establish a truly binding legal structure are constantly discouraged when AI companies and organisations develop their own ethical standards, routinely integrate ethical concerns into their public relations work, or implement ethically driven "self-commitments." Instead, we need true transparency systems that are independent of businesses and available to the general public.

Any AI system that is incorporated into people's lives must be worthy of the contest, accountability, and redress to citizens and members of the public interest, with citizens and members of the public interest questioning which systems really ought to be installed. Do the

[79] Liudmila Alekseeva et al., "The Demand For AI Skills In The Labour Market", SSRN Electronic Journal, 2019, doi:10.2139/ssrn.3470610.

issues need the most attention? And who makes the decisions? The answers to these questions affect citizens and customers alike. Shanahan warns against the "self-perpetuating propensity for power, wealth, and capital to accumulate in the hands of a small number of people." If we believe in the democratic ideal, which requires inclusivity and involvement in decision-making about our societies' futures, then hearing the voices of stakeholders is not optional but ethically and politically necessary.

Ethics standards and governance practices are inextricably linked. The work on technology ethics rules may serve as a forerunner to the law. They can provide guidance on the content of potential legal regulations, but they cannot substitute the law. Control, on the other side, is not the only solution; it is just one of many methods that can be used to bring ethical values into motion. Given the complexity and dynamism of data environments, lessons learned and synergic uses of different management instruments at various levels (multi-level governance) are critical.[80]

Summary:

Culture has an influence on ethics and values. Any product or method benefits greatly from the diversity of viewpoints and experiences. When reviewing the principles and structures, as well as creating a roadmap and deciding on our next steps, we must keep in mind the questions posed, such as "who sets the AI governance agenda?" When suggested generalisations and strategies ultimately contribute to the establishment of norms, standards, practices, and legislation, it is important to remain skeptical. Since private enterprise invests in the manufacture of these goods and reaps the benefits, it's likely that attempts will be made to influence the

discussion. The area of AI ethics must ensure that these goals and efforts are not blindly legitimised and that these institutions are kept to higher expectations and best practices. In the short term, developing responsible, ethical, and inclusive values and business models will cost money, time, and energy. However, in the long run, it will aid in the development of better and more sustainable goods and services that value society and operate with the needs of society rather than the interests of governments and private companies.[81]

CHAPTER: 06

How AI is regarded in Government

By way of introduction, the government in New Zealand aims to gradually integrate AI restrictions into the current legislation, as revised and amended, rather than having a strict rule on the use of artificial intelligence (AI) algorithms. We do not mean that predictive system ethical concerns are unique to these systems. Many have a wider application, and this should be reflected in regulatory decisions. We will illustrate two principal ways in that this section refers to a wider range of algorithms and frames, which are ethical issues we have addressed.[82]

The well regarded and known “Algorithm Assessment Report” portrays the government algorithm used in a positive light. "All of the algorithms studied are rooted in policies that provide direct public benefit," says the Executive Summary. Throughout, guarantees are given about things like transparency and internal review of decisions. The Algorithm Action Plan does, however, point out some confusion among the entities it looked at. It makes a variety of recommendations for best practice, some of which are addressed in the report's final section. The Ministry of Business Model Innovation and Employment wants to raise awareness and better understand how this technology can affect future economic development and accelerate prosperity for all New Zealanders.

The Ministry has provided the AI Forum with the requisite funding to conduct research. Much about AI's effect is unknown, but we need to start talking about it from a place of knowledge to understand how it will affect our lives. While AI adoption in New Zealand is still in its early stages, many of us are already engaging with it. Netflix and Amazon, for example,

[82] Sadiq J. Sarrouk, "Postgraduate Geothermal Energy Education Worldwide And The New Zealand Experience", Geothermics 70 (2017): 173-180, doi:10.1016/j.geothermics.2017.06.014.

use automated techniques algorithms to make product recommendations. Many of us, however, will not know this as AI. We hope that by supporting this study, we will help to debunk misconceptions about AI and its adoption, allowing for a more open discussion about how this disruptive technology can affect both the economy and society in New Zealand. We're also aware of the worries and questions that many New Zealanders will have about AI's effect on their lives and careers. Many workers are likely to be augmented by AI, freeing employees from more repetitive or rote activities to concentrate on more complex and imaginative work, improving our specific human characteristics like imagination, critical thinking, and teamwork.[83]

In the future, new and different skill sets will be needed, reinforcing the idea of life-long learning. Governments, educational institutions, and businesses would need to collaborate to sustain a more interactive technology and human workforce. If jobs are lost due to automation, we have the necessary support systems in place to ensure that re-skilling and re-training will take place. In the long run, I am hopeful about AI's positive effect on the New Zealand economy. It will help other developments emerge, such as the "Internet of Things" or Industry 4:0, which involves connected and autonomous vehicles. Industry 4.0 has grown from its early days as a manufacturing program to include smart transportation, smart buildings, smart healthcare, and even smart cities, all of which are aided by analytics. This, in my opinion, is AI's most revolutionary effect: the ability to help decision-making and use data insights to a level never before possible. New threats arise as a result of emerging technologies. Partnering with the industry and engaging more broadly will enable us to not only take advantage of the technology's potential but also to thoroughly investigate the "social license" issues surrounding AI adoption. These discussions will aid us in ensuring that no one is left behind that we can all benefit from

[83] Ibid

this game-changing technology. The AI Forum's research is a significant first step in the right direction.

6.1. Important Element towards Digital New Zealand:

Microsoft, as one of the world's leading AI developers, has been debating the social and economic consequences of AI for quite some time. I would like to share some of our thoughts and ideas about this journey with you. They're taken from The Future Approximated: Artificial Intelligence and Its Place in Society, which we just published [84].

To begin with, we can see that the countries that will do well in the AI era are those that adopt the improvements that AI enables quickly and efficiently. Wherever knowledge is useful, AI would be useful, enabling us to be more effective in virtually every area of human endeavor. Those who adopt technology would benefit from new employment and economic development, not those who oppose it.

Second, although we believe AI would assist in the improvement of everyday life and the resolution of major societal issues, we cannot afford to look forward to this future without caution. There will be opportunities as well as challenges. We must discuss the importance of good ethical values, the evolution of rules, the value of new skill training, and also labour market changes. If we are to make the most of AI, we must pull it all together.

Third, the issue of how we accept AI cannot be left solely to the tech industry. We all have a role to play in resolving the difficulties and risks we face together. This is preferable to letting a small number of corporations monitor AI's future. Since technology advances at such a rapid rate, those of us who develop AI, cloud, and other advancements will have a greater

[84] Hugh Tennent and New Zealand Government Commission on Investigation, "New Zealand And The Mandate For Western Samoa", Pacific Affairs 2, no. 7 (2019): 440, doi:10.2307/2750094.

understanding of how these innovations work than everyone else. That does not mean we will be able to figure out how to better handle the part they can play in society. This necessitates collaboration between Government, academia, industry, civil society, and other interested parties to help shape the future.[85]

6.2. Government's Regulatory Strategy for Artificial Intelligence (AI):

The aim of the AI Forum was to gain insight into the current AI environment in New Zealand, to inform the review of opportunities and challenges, and to aid policy growth. During early business discussions, it became clear that very few people or organisations are thinking about AI or its possible consequences. Due to a lack of knowledge of AI in the general market, the study centered on identifying who is actually involved in AI, either commercially or educationally. Conversations with individuals and organisations across New Zealand were used to perform the study. A survey of technology companies and other important consumers of technology was conducted in addition to the interviews. The aim of this section of the study was to gain a better understanding of New Zealanders' awareness, expectations, and attitudes against artificial intelligence.[86]

Some of these are still in effect in New Zealand, while others have already been introduced in other countries. A third cohort is only being suggested or discussed at this time. In legal literature, the word "regulation" is often debated and disputed. Some meanings go far beyond legal requirements. Regulation, according to Julia Black, is "the continuous and concentrated effort to modify the actions of others according to established expectations or

[85] Ibid
[86] Ibid

purposes with the aim of achieving a narrowly specified outcome or outcomes, which may include processes of standard-setting, information-gathering, and behavior modification."

We do not take a stance on the larger principle of regulation; however, for the purposes of this article, we will concentrate on steps that the New Zealand government or legislature might take. This is not to suggest that external influences like market forces or societal norms do not have an effect on actions. The question of how they could be used or monitored, on the other hand, is beyond the reach of this project.

The application of laws, legal guidelines, and codes of conduct to the use of learning analytics in Government is our concern. At the moment, New Zealand has no clear legal laws governing algorithms or artificial intelligence in general, but this is not to suggest that there are not any rules that apply to them. A significant question is whether an algorithm- or Intelligence regulatory response is required or whether current laws and norms could better govern these technologies. Before rushing to create a reform agenda for a new technology from the ground up, it's a good idea to think about what aspects of it we think need to be regulated and whether current regulations are adequate to deal with that. According to the National Science and Technology Council of the United States, if a risk falls beyond the scope of an established regulatory framework, the policy debate should focus on whether the current rules sufficiently resolve the risk or whether they need to be modified to accommodate AI.

We suggest nine desiderata for regulating the Government's use of predictive algorithms. Some of these are general concepts, such as the breadth of application, evenhandedness, and certainty, that are similar to Lon Fuller's well-known desiderata for legitimate law. Others are aimed directly at regulating emerging technologies, including predictive algorithms. It is agreed

that some desiderata would be more important in specific circumstances and that no form of regulation can meet all nine desiderata optimally.

- Regulations should be fairly appropriate to achieve their stated goals, in the same way as means must be reasonably tailored to their ends; regulations should not place a greater burden than is required to achieve a stated goal.
- In the pace of new change, regulations should be versatile and adaptable, and they should be reviewed on a regular basis.
- Laws should be compatible with existing rights to appeal critical decisions taken by public authorities regarding data subjects; if an appeal is impractical or insufficient, a decision-making process should be used.

6.2.1. Law & Individual Rights:

We start with a set of responses known as "hard law": primary and delegated legislation, as well as the decisions of courts tasked with interpreting and applying it. We will focus on different aspects of the regulatory framework that are related to the issues we listed, such as regulation, accountability, bias, and privacy [87].

As we will demonstrate, New Zealand legislation already contains a range of protections and remedies that are applicable in this situation. After that, we will look at some of the planned or adopted foreign initiatives. This will include the much-discussed GDPR from the European Union, as well as plans from the United States.

[87] Shilpa Verma, G. T. Thampi and Madhuri Rao, "ANN Based Method For Improving Gold Price Forecasting Accuracy Through Modified Gradient Descent Methods", *IAES International Journal Of Artificial Intelligence (IJ-AI)* 9, no. 1 (2020): 46, doi:10.11591/ijai.v9.i1.pp46-57.

The RoC-RoI algorithm has definitely been believed to be valid in this regard. While it has been stated that RoC-RoI "needs no clinical decisions or manual calculation," it appears that a provision for mechanical override has been made. Since "an offender's officially documented criminal background does not always represent the true nature of actual offending and therefore potential danger," the Department of Corrections agreed that "professional over-ride" was available to staff if other details existed that suggested a high risk posed by an offender.

The data controller must take reasonable action to protect the data subject's rights, privileges, and legitimate interests, including the right to request human interference from the controller, to convey his or her opinion, and to appeal the decision. New Zealand does not have a right that is explicitly comparable to Article 22. Other legal safeguards, on the other hand, can indirectly lead to the same outcome. A complaint was made to the Privacy Commissioner regarding a fully automated transfer mechanism between a collection company and a credit reporter in a case before the Privacy Commissioner. The procedure was found to be in violation of Principle 8 of the Privacy Act of 1993, which requires an institution that holds personal information to take appropriate measures to ensure that "the information is correct, up to date, full, important, and not misleading."

A manual notation had to be applied to the record to comply with Principle 8's accuracy requirement, according to the Commissioner. An individual had to be held "in the loop" in this case. The plaintiff, on the other hand, was unable to demonstrate that the violation of Principle 8 causes her any harm. The Privacy Act regime has a major restriction in this regard. It's also unclear how widely this policy or requirement has been conveyed.

According to the new section 86DC, the Chief Executive can only approve an automated system if "each system has the capacity to perform the necessary actions with appropriate reliability" and "there is a mechanism available by which a person affected by an electronic system action may have that action reviewed by a person approved by the managing director to review those actions."

The right to "a person in the loop" may therefore be "firmed up" in New Zealand law. What is the scope for this right to work? It may, for example, allow an affected individual the right to request that an automatic decision be checked by a human. Alternatively, it could impose a blanket prohibition on all agencies delegating such judgments to automated systems. The former tends to have the downside of requiring the injured party to be informed that they have been the target of an automated judgment, and as a result, it will need to be accompanied by a provision that the agency notifies them of this.

More broadly and clearly, whether such a right is needed depends on whether requiring a "person in the loop" is desirable. There are definitely cases where the information given by the algorithm is just part of what can be used to make a decision and where depending on it too heavily would be problematic. The Wisconsin Supreme Court agreed that the COMPAS algorithm's risk analysis is just one factor in a sentencing decision. In the case of the HART tool in Durham, it has been noted that the model clearly does not have all of the knowledge available to it, and therefore can only assist rather than replace human decision-makers. Custody officers will often be aware of other evidence that overrides the model's forecasts due to their own local experience and access to other data structures, and they will have to apply their own decisions in deciding on the outcome of each offender's case.

6.3. WEF on Artificial Intelligence (AI):

The New Zealand government had been invited to collaborate with the World Economic Forum's Center for the Fourth Industrial in San Francisco on the creation of new and flexible regulatory methods for Al. WEF sees New Zealand as a perfect test ground for this kind of agile thinking because of its limited size," the spokesperson said. "We have a tiny, stable democracy with a quick-moving government. Internally, through our Government and broader society, we are well-connected, and we have good international partnerships. We are regarded as a digitally advanced country.[88]

According to Computerworld, the project lead for machine learning at the World Economic Forum (WEF) states, The project team has created a draught guide for policymakers to help shape their thinking when it comes to AI regulation. A section on tools and methods is included in this roadmap, which suggests policymakers consider a combination of soft and hard regulations and levers. Under the New Zealand government, attempts are being made to find options for controlling government algorithms. While this work is performed by the New Zealand government, it will serve as a case study for the project since it will test elements of the high-level roadmap. Since the roadmap's inception, cooperation with the global community has streamlined the scoping, and the focus has shifted from the high-level roadmap to evidence gathering and tool growth. The project team's group workshops proposed that the creative methods and tools should focus on national discussions about AI ethics and principles, evaluation, and possibilities for a global hub.[89]

[88] Daniela Freddi, "Digitalisation And Employment In Manufacturing", AI & SOCIETY 33, no. 3 (2017): 393-403, doi:10.1007/s00146-017-0740-5.

[89] Ibid

The measures will be part of the New Zealand Government's Digital Public Service Strategy, which was released in November 2019 and is defined as a call to arms for the public sector to work in the digital environment in a more modern and effective manner, achieving the results that New Zealand requires. The Digital Public Service Plan, The need for strong digital foundations that can be used in the public sector, are identified. For example, defining suitable policy and regulatory criteria for emerging technologies like AI is one example. This will ensure that emerging innovations are implemented in a legal, secure, open, and public-friendly manner.

Artificial intelligence's ability to change commerce, Government, and daily life has sparked a lot of interest in New Zealand and elsewhere. Artificial intelligence is the next step forward. Its effect has been compared to the invention of electricity, and it is a key component of the Fourth Industrial Revolution, according to the World Economic Forum.

Such explanations create the appearance that those who do not accept AI wholeheartedly risk falling behind and losing out on significant benefits. But what exactly are these benefits, and what do they mean for New Zealand's present and potential public service delivery? New Zealand's latest Algorithm Evaluation Report begins by stating that "algorithms play a critical role in promoting government programs to New Zealanders and in providing new, creative, and well-targeted strategies to achieve government goals."

New Zealand is extremely creative in the provision of public services, as are many modern democracies, which is contrary to public authorities' common expectations. Statistics have been a valuable way of administering justice for a long time. Indeed, it was developed to increase the efficiency, effectiveness, and egalitarians of government. Initially, the field was called "political arithmetic," with the modern word "statistics" derived from the Latin word "statistician,"

meaning "state man," and the German word "Statistik" sometimes translated as "state science." While the statistical ideas behind most AI are not fresh, they are both computer and robotic systems as well as the corporate environments in which they are developed and deployed. In fact, modern predictive analytics are using four specific features by governments in New Zealand and around the world.

6.3.1. Nature of Complexity & Sensitivity:

The difficulty of AI poses concerns about working safely and avoiding negative consequences. This can only be accomplished, as with any technology, by conducting extensive testing in a range of circumstances during design and implementation. Once an AI system (for example, a self-driving car) must restore control to a human in a critical situation, the situation becomes much more complicated. This opens the door to a wider conversation of the military, cyber warfare, weaponisation, and other potentially dangerous AI applications. New Zealand must invest in gaining a better understanding of the possible risks. AI, in particular, must be included in our national cyber security policy, which is explored in greater depth. Another high-profile topic that is currently being debated at the international level is the rise of lethal killer robots allowed by AI. The Movement to Stop Killer Robots is a global alliance of non-governmental organisations working to ensure that human influence over the use of force is preserved by preventing the creation, manufacturing, and use of a younger breed of fully autonomous weapons.

Recent developments in machine learning have facilitated the creation of far more sophisticated predictive methods than the actuarial tables and checkbox types that have dominated much of modern Government's history. Although this has significantly increased the accuracy of machine learning tools, it also restricts government workers' ability to grasp the tools

they are using when making operational decisions. Although the definition of a decision tree is clear, users cannot imagine how a random forest model consisting of decision trees with millions of nodes, such as the HART model, will work. A consumer may also understand that a deep learning algorithm with a neural net architecture can learn patterns in data and represent them in the results it produces. Deep learning systems, on the other hand, are basically "black boxes" from the perspective of those that use them, unlike conventional checkbox systems.

The economic property of learning analytics for government use has benefited from artificial intelligence's success in many fields. Equitant, a private American company, produces COMPAS. While we have some broad-brush knowledge about the machine learning methods used in COMPAS, market sensitivity means that its workings are largely invisible not only to the inmates who use it but also to the correctional agencies that use it. An intellectual property right is, of course, a standard aspect of the business world. Nonetheless, this commercial obscurity has posed a challenge for data subjects who have objected to its use, as well as the company itself. It would be better able to respond to recent studies suggesting that the results provided by the company's question data collection method can be bettered by an exceedingly simple algorithm focused only on the offender's age, sex, and prior convictions, or that COMPAS can be surpassed by the untutored judgments of groups if it was in a better position to reveal the workings of its algorithm.

6.3.2. Automation & Availability:

Routine activities have long been automated with the help of technology. Artificial intelligence has the potential to relieve employees of cognitive drudgery, much as industrial automation did for physical labour. There is a lot of room in the Government to speed up the resolution of routine applications without involving humans. Automation for the delivery of

public services is becoming more common around the world. These systems use a human-like interface to combine machine learning, basic business principles, computer vision, speech recognition, and speech recognition to automate transactional tasks. In government contexts such as primary health care and immigration, such virtual assistants are progressively being used in unsupervised triage positions.

New Zealand's Privacy Commissioner and Government Chief Data Steward established "principles for the secure and efficient use of data and analytics," which suggest that government use of predictive algorithms require "retaining human oversight" because "analytical processes are a method to inform rational decision and should never completely replace human oversight." In response to this theory, the Algorithm Evaluation Report states, "As technology continues to grow, government agencies will continue to have to balance the value of human oversight with potential service delivery efficiencies." Indeed, the ACC's "Cover Decision" algorithm is already set up to make decisions about ACC coverage in simple cases without the need for human interference. As a result of a number of technological, social, and commercial factors, the new generation of predictive tools is deserving of consideration as a new, efficient, and potentially very advantageous mechanism for government service delivery. Another reason for the current emphasis on these innovations is that they have become an integral part of New Zealand's "social investment" approach to public service delivery.

Statistical tools are becoming more nuanced and opaque in their function at the same time as they are becoming more open and easier to use. Google's Tensor Flow framework, as well as any system built by the "Open AI" community, are examples of some of the most cutting-edge and efficient computer vision systems that are available for free as open-source. New Zealand, like most other countries, is collecting a growing amount of data. It would seem remiss of

government agencies not to use similar approaches to improve the quality and fairness of strategic activities in an era where we are accustomed to sophisticated, powerful algorithms based on large datasets accessible via our smartphones. This paves the way for more effective, timely, and reliable delivery of public services than ever before. The exciting possibilities offered by predictive algorithms are also fueling growing concerns that advances in data science will make governments more efficient at gathering a growing volume of data about their citizens and that this increase in surveillance will likely fall unequally, with communities that are already over there in various social statistics problems persist and greasier surveillance.

6.4. New Zealand Society & Artificial Intelligence (AI):

There are various ways in which artificial intelligence (AI) will benefit New Zealand society, and this section will look at the possible effects on education, healthcare, and the environment. We must also recognise the potential societal challenges that AI can pose, such as job losses, algorithmic bias, accountability, efficiency, protection, and ethics. Although we do not yet know the long-term effects of AI on society, we expect them to be meaningful. The majority of New Zealanders are uncertain how AI will affect the future. According to our findings, 70% of respondents were worried that AI could make biased, unjust, or incorrect decisions. However, only 13% of companies planning to use AI plan to set up some kind of AI ethics committee, according to the report. As New Zealand continues to use AI more extensively, it is critical that we recognise both the potential societal benefits and the potential negative consequences of AI as a country. If New Zealand fails to understand the social, legal, and ethical ramifications of AI, AI deployments are more likely to have unexpected effects. Simultaneously, if used appropriately, AI has the ability to have major social benefits.

AI has the ability to help New Zealanders live in a more equal, egalitarian, and prosperous community. The opportunity to personalise education and healthcare, in particular, would have a huge impact on the lives of New Zealanders. AI can also help with social goals like improving social justice and eliminating poverty. The opportunity to personalise programs, such as education and healthcare, would have a significant impact on the lives of New Zealanders. AI has the ability to help New Zealanders live in a more equal, egalitarian, and productive community.

6.4.1. Role of Artificial Intelligence (AI) in Education:

The use of artificial intelligence in education is set to revolutionise the way it is delivered. However, we must understand what potential students will need to know in order to be active members of society in a digitally advanced society. AI would be the catalyst for a significant change away from standardised mass schooling and toward personalised learning. Teachers can quickly track student progress thanks to AI. Teachers will then provide personally personalised learning to help students enhance their success in needed areas while also enabling them to explore other areas where they excel. Data can be compiled to give teachers an overview of how the class and individual students are progressing. The data would also assist them in adapting their teaching to produce the best possible outcomes. In the end, artificial intelligence (AI) will offer an alternative method of providing education, which will also extend to the corporate training industry. AI will greatly assist in the creation of human capital through training. Identifying and cultivating talent within a company is mostly done on the fly these days. Employees would be better served and more efficient if AI is used to improve and advance them. In a skills shortage, these workers may be more inclined to remain with a company that invests in their growth.

6.4.2. Learning & Talent Development:

As AI and other automation innovations reshape how we interact with work as a culture, the conventional paradigm of "read, work, retire" will become increasingly obsolete. Some existing roles will be reshaped, while others will be eliminated, and entirely new roles will be established. Entry to lifelong learning will become highly essential regardless of individual position shifts. Adult employees will increasingly need to be retrained in the coming years. According to the participants in our study, New Zealand does not actually have sufficiently sufficient retraining opportunities. Individualised AI-powered learning systems could be built to support people at all levels of their careers who need to enhance their skills.

New Zealand, like most advanced economies, is facing a growing scarcity of university graduates. Just 5,090 computer science or information systems students graduated in 2015, according to a recent report of the New Zealand digital skills landscape45, but the tech industry generated nearly 14,000 new jobs in 2016. Machine learning was expected to have the highest rise in demand. Machine learning was also found to be the most in-demand skill, with the highest market growth in Tech Industry, New York, and London, according to the report. According to the study, we must concentrate our efforts immediately on raising the size of graduates includes the Development of New Zealand. The Digital Skills report made a number of recommendations for developing a tech talent pipeline, all of which are important to the growth of an AI talent pool in New Zealand, such as ensuring that every child is exposed to digital technology at school and educating Kiwis about the value of digital skills. Run a nationwide campaign to increase the number of people learning modern digital skills and actively inspire people from all walks of life to get involved with digital technology.

As AI automates process-driven job functions, people's critical thinking and creativity will become increasingly important. The introduction of 'innovation Labouratories,' where employers value ingenuity and critical thinking, has started this transformation in New Zealand. While STEM (science, technology, engineering, and math) is significant, we should also encourage STEM (science, technology, engineering, arts, and math) students to learn creative thinking skills.

6.5. Regulation & Legislation of Artificial Intelligence (AI):

Legislators have not taken robots with human-like abilities into account when creating laws until now. The topic of law and regulation relating to AI is a global one for several commercial systems. Most countries are having similar discussions, and international forums such as The Partnership on AI and political organisations such as the United Nations could be the best venues for these discussions to take place. One New Zealand-based academic proposes the development of a specialist intergovernmental organisation to facilitate a standardised open attitude to AI regulation, with New Zealand having the ability to lead the way as a neutral host country. However, New Zealand politicians would need to consider local laws in the fields of legal responsibility, agency, and causation at some stage. Although preemptive regulation could have good intentions, it has the potential to have unintended effects, including the loss of New Zealand's competitive advantage. One of our common law system's perceived strengths is its ability to adapt to changing circumstances.

6.5.1. Business Regulatory Response:

The widespread introduction of AI-based automation – called "robot lawyers" in common parlance – poses a major opportunity to make legal services more broadly available and inclusive. Regardless of new legislation or rules, certain businesses will have to rethink how the

rules apply to them in an AI world. There is consensus in some literature that New Zealand companies must begin to recognise possible legal consequences arising from the use of AI and begin to fix them right away in order to ensure that no unnecessary obstacles are erected to discourage AI from realising its potential. New Zealand companies, for example, may not have the same legal copyright rights as other countries, which are needed for data mining. Local companies could be considered to be at a disadvantage in comparison to international rivals as a result of this. In general, research participants believe that the legal and regulatory ramifications of AI are currently underappreciated. They recommended that it be approached ahead of time to prevent unintended consequences such as a loss of global competitiveness. On a realistic level, it seems that regulators are investigating problems as they emerge as more automated systems are implemented. Consider the work of the Ministry of Transport on Intelligent Transportation Systems.

CHAPTER: 7

The Impact of AI on Data & Digital Infrastructure.

Cities establish tangible and intangible infrastructure and services and platforms from which individuals can self-actualise and, as a result, generate products and services that increase the general population's standard of living. As a result, the city bears a comprehensive responsibility for the effect of its hard and soft qualities on its residents, making it an entity responsible for ensuring the quality and reliability of its metta. Cities exploit the advantages of technological advances and introduce new artificial intelligence (AI) innovations as part of the relentless need to fuel economic growth and development; the aim is to exponentially improve sustainability through the effective use of energy and resources [90].

Many cities worldwide, including Amsterdam, Dublin, San Francisco, Stockholm, Malaysia, Singapore, Vienna, and Toronto, are using AI-based technologies to improve their urban accessibility and service quality. The smart grid project, for example, serves as one of the foundations for the use of AI in cities; it enables spatial navigation through interactive and observation that use data analysis techniques to expose the complexities of the urban grid. Cities have recognised unique needs as a result of digitalisation, resulting in improved efficiency and economic performance. As a result, AI provides an opportunity for improved city governance; AI principles and technology will impact and transform how the city serves its people, ensuring that everyone has access to the desired and sustainable urban futures.

The innate need to adapt to environmentally sustainable policies is one of the most notable factors that has led cities to become smart. The unprecedented nature of global warming

[90] Serdar Aydin and Begüm Aktaş, "Developing An Integrated VR Infrastructure In Architectural Design Education", Frontiers In Robotics And AI 7 (2020), doi:10.3389/frobt.2020.495468.

has necessitated a reorganisation of resource usage, requiring smart technology to help in the standardised allocation of energy, resulting in a reduction in city carbon footprints. As a result, smart environment technologies are commonly used in cities. They are AI-driven systems that include smart traffic lights, noise forecasting, air quality estimation, pedestrian traffic, and car traffic forecast faculties. All of this is made possible by big data technology, which makes data processing simpler. As a result, ultra-accurate urban data is generated, allowing for highly efficient initiatives and allowing cities to use their sustainable resources[91].

Cities have reaped substantial benefits from using AI to develop and execute city management strategies so far. Nonetheless, it is estimated that there is an awareness gap, especially in how the general public views the adoption of those technologies and how they feel about the widespread use of AI in their cities. A thorough understanding of the public's views of AI ideas and technologies in their communities will provide policymakers with valuable insight into public opinion on various aspects of AI. As a result, government departments will be better positioned to respond to public demands and implement AI technology and cities' applications. As a result, it is important to investigate how AI communicates directly with individuals and dissect how various AI instruments can potentially help or harm a person or group.

The advantage of digital companies is modern software stacks and the widespread use of accessible and cloud-based technology. Cloud-based development of cloud software promotes cloud computing and cloud technologies such as micro services, API first, containers, and DevOps and related capabilities such as container orchestration, mesh service, and immutable transport systems.

[91] Ibid

7.1. Service of Digital Infrastructure:

Artificial intelligence has advanced in recent years (AI). However, the quest for more sophisticated AI to boost the customer experience and streamline business processes continues. These days, almost every company has to make a real-time decision due to the influx of data in organisations from different applications and IoT sensors. As a result, cloud providers must integrate AI into their systems[92].

However, since incorporating AI into a business system is costly, AI applications are now accessible via providers of as-a-service systems at a much lower cost and risk. The company just needs to feed the data and pay for the algorithms and computing resources with AI-as-a-service. It takes advantage of cloud vendors' already existing infrastructure. Machine learning is used in AI-as-a-service to optimise data and uncover possibilities in even the most challenging situations. Companies no longer need to invest a lot of money in technology and technological solutions to solve storage problems. This has enabled businesses of all sizes to profit from AI by removing the expenditure and expertise barriers.

Furthermore, this has allowed such organisations to take on complex AI ventures at a nonlinear way cost while still adhering to data privacy regulations. Amazon, Google, IBM, and Microsoft have already built the platform and begun providing services. Organisations' unique roles necessitate custom-engineering of technology. Artificial intelligence as a service allows a third-party to provide artificially intelligent outsourcing. Server-less Ai systems are in high demand as businesses increasingly migrate their business processes to the cloud. AI-as-a-service

[92] Robert Hanna and Emre Kasim, "Philosophical Foundations For Digital Ethics And AI Ethics: A Dignitarian Approach", AI And Ethics, 2021, doi:10.1007/s43681-021-00040-9.

eliminates the need for servers in favor of cloud-based functions, lowering operating costs and supplier dependencies. The following types of AI as a service are already disrupting the market:

Digital assistants and bots: This category includes chat bots that use natural language processing (NLP) algorithms that learn from human communication and actions and provide answers to questions. This allows customer service representatives to finish their chatting duties quickly and move on to more difficult tasks. APIs for cognitive computing: These enable application development interface developers to integrate a new service or technology into their application without starting from scratch. Machine learning frameworks: This aids developers in developing applications that obtain data from previous company records. Furthermore, this form of AI as a service allows for integrating machine learning tasks without the need for a big data environment. Fully-managed machine learning services: This is an add-on to machine learning that assists developers with models, pre-built models, and drag-and-drop tools to deal with more complicated issues and build a personalised machine learning system[93].

7.2. Artificial Intelligence in Digital infrastructure:

As key elements of digital transformation, machine learning and artificial intelligence learning are often mentioned. Despite its call for IA-integration into all aspects of their technology from compliance to data analysis, cyber protection, and storage by companies in all sectors and industries. In this age of digital technology, artificial intelligence affects all businesses. AI is among the most common trends for businesses that exploit artificial intelligence in the IT infrastructure. As the size and complexity of a company increase, the adaptation of IT technology to meet these requirements is essential. This could be done by integrating artificial

[93] Ibid

intelligence (AI) into IT infrastructure and management. IT infrastructure, according to experts, is a domain where AI's ability can be completely realised. [94]

- To anticipate any breach of data in the system or network, IT facilities with artificial intelligence can read the operator's habits. Only artificial intelligence-based cyber security systems have a unique fire protection capacity that helps businesses manage malware and cyber-attacks effectively. Experts usually advise big data companies to choose proactive, not reactive, Cyber security strategies.
- Artificial intelligence will help companies who need IT support 24/7 to reduce costs and improve service. IT assistance is one of the automated activities for saving time and effort. AI-based support service is part of a cost-effective support system. An automated support system can take a great deal of time and work to complete. However, providing ongoing reviews and improving AI can help companies create the most customer-friendly presenting.
- When used to build a solid IT system, artificial intelligence may help lead management and understand the customer's path from lead to daily client. Machine learning helps improve decision-making and relieves the burden on human resources by using real-time tracking. AI eliminates the complexities of business processes and reduces costs by augmenting softer human skills, resulting in improved decision making and happier customers, thanks to full visibility into all process relations and interdependencies for business infrastructure systems on both premises and in the cloud.
- Artificial Intelligence is worthy of deciphering the intricacies of a company's networks and performing real-time monitoring. As a result, the study of various market aspects

and

[94] Serdar Aydin and Begüm Aktaş, "Developing An Integrated VR Infrastructure In Architectural Design Education", *Frontiers In Robotics And AI* 7 (2020), doi:10.3389/frobt.2020.495468.

the insights gained are far more detailed. Artificial Intelligence (AI) could forecast requirements for the coming quarter, deploying resources as required and addressing issues as they arise. This, however, could be possible only if Artificial Intelligence has been used in all business processes, knowledge flows flawlessly from one vertical to the next, and standard procedures are followed.

Because of AI's ability to reduce costs and increase business efficiencies, the importance of artificial intelligence in IT infrastructure is growing. Utilising the best available technology is no longer a matter of competitive advantage but sustainability and keeping the company currently in the era of digital transformation. Artificial Intelligence has the potential to not only augment human success but also to fully automate many business operations in a few years. Even if this is a pipe dream for the future, companies must begin to reconsider human-machine interactions in this era of digital transformation.

7.3. Impact on Digital Infrastructure:

According to this report, artificial intelligence, cyber security, data control, and sustainability would all play a role in how businesses go through digital transformation. Global interconnection and data center companies released the top five technology trend predictions for 2021. They point to the vital digital transformation that organisations are undergoing to lead in the modern digital age. Its global scope and position as a leading meeting and connectivity point for ecosystems of networks, clouds, businesses, and nearly 11,000 customers give it a rare and holistic perspective on important digital infrastructure trends.

The disturbance caused by AI infiltrating every part of digital services is important, and it can have far-reaching effects on software developers and IT support providers. Let's take a look at how it impacts IT infrastructure management services directly.

- The need for even more services is likely to be the most important effect of AI on infrastructure service providers. Organisations pursue cloud computing services or servers with connections to GPUs and CPUs with multiple cores to provide large computing capacity for AI systems. AI training, also known as machine learning, necessitates a large amount of data, which necessitates further storage in addition to computing power. As a result, an excess of network access will be needed to support them.
- Since software security products generate mountains of logged data, it's virtually difficult for people agents to analyse it independently. Innovative analytics for defense, user and organisation behavior, threat intelligence, and other fields are now emerging that use machine learning or complex algorithms to track, avert, and mitigate attacks that would otherwise go undetected. Black hat coders might, of course, implement AI into their systems and make AI-based attacks commonplace. The situation, however, is still a long way off.
- Networks and other interfaces can also be tracked using artificial intelligence. Some platforms provide AI-based full-stack monitoring, combining machine learning with data analytics to provide IT, service providers, with smart monitoring capabilities. Platforms with monitoring features include Dynatrace, Spunk, and SumoLogic.
- Siri, Alexa, and Cortana are smart assistants that most of us have grown accustomed to and want to have with us at all times. We've grown accustomed to chat bots on different

websites answering our questions. AI may be incorporated in helpdesks shortly. IT infrastructure management systems need round-the-clock support; with automated support, IT support practitioners may be relieved of the responsibility of being available 24 hours a day, seven days a week, while still serving their organisations effectively. IBM Watson and IPSoft's Amelia are two examples of applications with restricted helpdesk capabilities.

- AI is expected to revolutionise storage management, according to industry experts. Systems could learn I/O patterns and data life cycles using machine learning. This could allow storage systems to make more informed decisions about storage optimisation and tiered storage. What are the chances? Perhaps, one day, AI will predict when a storage solution is about to fail, giving users enough time to make backups and make hardware adjustments if necessary.
- While the technology is still in its early stages, some industry analysts assume that, in the future, AI will be capable of effectively controlling and maintaining the entire infrastructure, rather than only protecting, managing, and addressing network-related queries. AI-powered or AI-defined infrastructure management is the highest level of optimisation in infrastructure management. Even as you read this post, software-developed data centers and specific software applications are in the process of creating fundamental technologies that could make this vision a reality.

7.4. Acceleration of Hybrid Multi-cloud Adoption:

Many sectors are experiencing a seismic change as companies adopt edge technology and hybrid multi-cloud frameworks. Computers are moving more and more from centralised data

centers to the edge, where the sharing of data and connections between companies and cloud providers is increasing exponentially[95].

Edge computing is becoming a key factor for other emerging technologies, such as 5G mobile communications that allow for faster access by IoT and other cutting-edge devices to data and compute one-digit millisecond latency resources. According to IDC, up from under 10% today, more than half of new company technology projects will be at the cut-off rather than data centers by 2023. By 2024, there will be an 800 percent increase in edge applications. The IDC study shows that businesses must reshape IT to be virtualised, containerised, and software-defined to support the edge. They can also look for potential network infrastructure partners to optimise the edge development and networking costs and connectivity costs for devices[96].

As a result, the firm expects that by 2020, edge computing will be a key driver in driving hybrid multi-cloud deployment across all market segments worldwide. According to the third annual Global Interconnection Index (GXI), private connectivity between enterprises and cloud and IT service providers would expand by 112 percent annually between 2018 and 2022. Traditional cloud computing architectures, which are highly centralised, are expected to evolve, according to the study, as businesses seek to expand cloud computing to the edge to address challenges posed by the large scalable nature of modern digital business applications.

- Lower bandwidth and bandwidth savings, correlative high-speed, low-latency connections are needed for businesses to materially reduce the "distance gap" between their software and data workloads and cloud service providers by combining edge computing and hybrid multi-cloud adoption (CSPs). Data access and application response

[95] Ibid
[96] Ibid

times can be sped up, and cost savings from reduced information transmission can be realised by taking agile and flexible cloud environments closer to users at the edge.

- When it comes to enterprise hybrid multi-cloud use, businesses typically choose which cloud platform to run their applications based on which CSP provides the best support for a given workload. Because of this freedom of choice, IT organisations can easily and cost-effectively test various cloud systems to see which provides the best service quality at the best price. Furthermore, more than ever before, businesses need the flexibility to keep ownership of and safely run mission-critical applications in-house, as well as the ability to leverage both private and open hybrid cloud systems based on individual use cases.
- Political and regulatory factors: As security and privacy violations become more common and complicated, many countries restrict where and how data can be used. More dispersed data centers and cloud providers that hold data local to a single geographic area or country will result from these privacy and security sovereignty enforcement requirements.

7.5. New Interconnection & Processing:

The author instead says companies will speed up the adoption, for a wider range of usage cases, of AI and Machines Learning (ML), as large datasets derived from a variety of sources become more complicated and time-sensitive. Each day several terabytes of data may be produced by a smart clinic tracking patients' wellbeing, a hundred equipped sensor planes, or an automatic vehicle generating the telematics data. On average, 76 percent of AI/analytics apps can use ten external sources of information. The Researchers believe that companies can continue to rely on providers of public cloud services, with the majority of them finding ways to integrate

the best AI/ML capacities on a number of CSPs, resulting in distributed and hybrid AI/ML data processing architecture[97].

However, For many applications, the researcher believes that some AI/ML information and analysis (including inference and model training) would be needed closely to data purchasing and supply sources by additional strict rules on latency, efficiency, privacy, and protection. This will encourage the adoption of new frameworks and multi-cloud cloud-adjacent edge services, providing enhanced control, monitoring, enforcement, and protected AI/ML data, and low-latent access to remote data and computer services infrastructure, according to the writer. Besides, better interconnection and data rates will pave the way for new digital data markets. Research indicates that data suppliers and consumers can transact in vendor-neutral data centers within an easy and secure range.

7.6. New Data Management Capability:

Infringement of cyber security is one of the world's biggest threats, according to the World Economic Forum. Every organisation and person is affected by the challenges of cyber security we face today and in the future. Cyber threats appear to have a worldwide financial impact, with an estimated cost of USD 6 trillion per annum in the year up to 2021. With the rise of cyber security and security and confidentiality regulations, most businesses now access cloud services through their private networks and save their encryption at a location separate from their data in a cloud-based Hardware Security Module (HSM). With this HSM-like service model, you gain greater control over your data, improve operational resilience, and support hybrid technology architecture.

According to the report, the company will shift to the mainstream in 2020 to enable companies to safely operate the computation, with new data-processing abilities, such as multitasks protected computer, completely holomorphic encrypted data, and secure encounters where even a company cannot peer with the cloud-based code.

Many companies today buy and sell information to gain a competitive advantage, but they have to comply with public privacy and security regulations. In the wake of the European Union Data Protection Act, the burden of companies to comply with privacy legislation was extended to other local regulatory systems, among others, including the California Consumer Protection Act. The legislation on data sovereignty to prevent the transmission of personal data on people outside their borders has either been declared or under development by 121 countries.

We expect that in 2020, personal data protection will become even more complicated as global movements toward tighter or new data privacy laws gain traction, making it more difficult for global businesses operating in multiple markets to manage. According to a recent survey of over 2,460 IT, decision-makers worldwide commissioned by the author, 69 percent of global respondents rated "compliance with data protection regulations" as a top priority for their company. In comparison, 43 percent cited "changing legal standards around data privacy" as a challenge to their business. In 2020, according to the researcher, IT techniques will increasingly concentrate on data protection, with the stable discovery, classification, and encryption of personal information continuing to be used (PII). HSMs, according to the author, would be an important part of a data protection framework and strategy for encoding PII and providing an extremely high degree of data security[98].

7.7. World Sustainability:

As per the researchers, 42% of IT decision-makers believe that a company's suppliers' "greenness" directly affects their purchasing decisions. With rising strains on the world's resources and a growing willingness by many businesses to minimise emissions, the author believes that digital transformation would help place the world's economy on a more sustainable path.

As stakeholders increasingly look to digital companies to lead and innovate in energy responsibility and sustainability, sustainability will likely be an initiative for world-class organisations in 2020. The author also believes that digital and technological advances would allow businesses to address obstacles such as supply chain geographic dispersion, material complexity, and product deconstruction. Companies can balance supply and demand for underutilised assets and goods using device and data analytics. When combined with phones, "the cloud" has the potential to dematerialise goods and even whole industries. Businesses will turn to vendor-neutral colocation data center providers dedicated, outspoken, and proven champions for environmental sustainability. According to the author, they rely on data center services to communicate with customers and operate many aspects of their operations[99].

7.8. Digital Infrastructure during COVID-19:

Natural disasters caused by climate change are pushing countries all over the world to upgrade their physical infrastructure. Pandemics like COVID 19 highlight the importance of incorporating digital technology to respond to these challenges in our increasingly digital environment. Artificial intelligence, in particular, has the potential to be a critical tool in

[99] Anthony J. Rhem, "AI Ethics And Its Impact On Knowledge Management", *AI And Ethics* 1, no. 1 (2020): 33-37, doi:10.1007/s43681-020-00015-2.

assisting us in keeping these and imminent attacks under control. Artificial Intelligence (AI) has made it much easier for scientists to share their ideas and knowledge. On all of these questions, we have not seen much use of AI for inter-governmental cooperation. The Council of Europe's contribution to artificial intelligence research and its role in fighting Covid-19 is investigated by the Director of Digital Government Action Against Crime.

We need better integration of artificial intelligence into a public-health emergency, and a study of Big Data related to citizen travel, disease transmission trend, and health monitoring should be used in order to facilitate preventative action in order to deal with COVID 19 and future public health emergencies.

Cities around the world have given technology innovation priority to prevent a natural disaster such as an earthquake, tsunamis, and hurricanes from protecting their physical environment. However, pandemics have shown that in the event of biological disasters, these approaches are insufficient to maintain connectivity and access to society. The main challenge at this time of crisis is the incorporation and improvement of digital technology in various phases of the response to public health issues, especially disease prediction and decision-making. In the eighteen years since SARS, the emergence of a new digital era, artificial intelligence, and the Internet - of things (IoT) can play a major role in controlling this new virus[100].

Instead of flesh-and-blood spies, governments now depend on pervasive instruments (sensors) and efficient algorithms. Several governments have used these surveillance techniques in the fight against COVID-19. Maps of the world show how reducing people's transportation has significantly reduced carbon emissions in various countries, but what about emerging

[100] Ibid

technologies? Can an increase in pollution from other sources be caused by the number of people working from homes or using digital devices in quarantine?

What's remarkable is how AI has greatly enabled scientific community exchanges of ideas and knowledge. On all of these questions, we have not seen much use of AI for inter-governmental cooperation. To use the proximity tracing app as an example, there were regional calls for tenders for businesses to submit applications for such apps during the lockdown in neighboring countries, which were held simultaneously in neighboring countries without any details being exchanged. This is truly amasing. Of course, the only solution is cross-border. We live in Strasbourg, which is on the outskirts of France. Of course, very little travel became possible during the lockdown, but thousands of people now cross the border every day. Hundreds of thousands of people cross borders every day to work in some member states, but a contact tracing app would not work across borders.

Now that the summer holidays are coming, people will be traveling once more. If there was a single app with a single protocol that people could trust because it was agreed upon by various governments, it would be ideal. And they develop it using the appropriate methods; that is, they pay careful attention to data protection authorities' advice. They make certain that these items are seen and checked, and you can have a useful tool. The Digital Divide is another subject I would like to bring up in this regard. This concept is often used to define a technological divide between the developed world and the developing world. Advanced technology is available throughout the developed world but not in the developing world. However, there is a Digital Divide in our nations. About a quarter of the population, or 17 million people, do not own a smartphone in France. So you can roll out great mobile tools, but if people do not have one, they

will not get much use out of them. For example, we have seen in many countries that the elderly are the least trained and the most vulnerable to Covid-19 as part of the Digital Divide.

7.9. Prediction & Response:

We are seeing three major trends across the globe due to the ongoing covid-19 pandemic: a greater acceptance of online services, a huge demand for internet services for traditional industries, and increased connectivity among different types of industries.

These three data sources provide crucial, real-time information about disease-spreading travel trends and longitudinal shifts in vulnerable populations, which have historically been difficult to measure on pandemic timelines. This knowledge would be crucial in planning surveillance and containment strategies, given the exponential increase in mobility and increasing global connectivity. In collaboration with their respective state governments, some researchers and private institutions are developing HealthMap. This digital network visually depicts disease outbreaks based on place, time, and the type of infectious virus or bacterial disease brought into the city.

To predict and model outbreaks, digital infrastructure is critical. Consider AI-assisted lung CT scan services: the AI is programmed to quickly detect lesions of probable coronavirus pneumonia, measure their volume, shape, and density, and compare changes in multiple lung lesions from the picture. This produces a quantitative report that aids doctors in making swift decisions and thus speeds up the assessment of patients' well-being.

Via community-driven contact-tracing technologies, governments worldwide are increasingly building the investment channels and engineering capabilities needed to combat the pandemic and stop COVID-19 from spreading. With a collection of digital resources to help

distribute timely and precise information to its people, citizens can respond assertively and rapidly to pandemic diseases. Hundreds of thousands of facial recognition cameras and people recording their metabolic rate and medical condition are being used by many governments to enable private companies to create creative tools. Authorities can easily classify suspected coronavirus carriers and others with whom they have had contact using this method—a slew of smartphone apps alert people to the presence of infected patients.

7.10. The line towards Better Future:

The virus has given digital infrastructure production a fresh start. Using the cloud, big data, and AI apps, companies may develop new business models that help people realise the pandemic disease's seriousness and take preventative measures. A group of stakeholders is putting millions of dollars into pharmaceutical companies to find a cure for the virus. Different financial models will emerge to ease the financial crisis during the growth process, such as Public-Private Collaboration and consumption/outcome-based models, to modernise, upgrade, and update our infrastructure and counter this and future pandemics. It is now time for countries to accelerate the building of new communications transformation, such as IoT and AI, and the completion of crucial projects and large infrastructure projects that are already included in their fiscal stimulus plans.

CHAPTER: 08

Developing a Legal Rationale for AI

Artificial intelligence (AI) is now pervasive in almost every aspect of life. It has prompted a paradigm change in several areas, necessitating the re-engineering of operating and business models. AI is described as "the science and engineering of making intelligent machines" that use "cognitive computing" to allow computers to learn, reason, interpret, infer, communicate, and make decisions in the same way that humans do. Machine learning (ML), which includes deep learning and business intelligence, and natural language processing, are among AI branches (NLP). While AI has had a revolutionary impact on every industry and career, the legal profession has yet to understand its potential fully. The legal services industry is still heavily digitised, tradition-bound, and reluctant to adopt new technology and tools. However, due to rapid technological development and exponentially rising computing capacity, AI will be commonly used in the future realm of justice[101].

The loss of certain large-scale occupational groups has also been countered by developing new sectors that absorb jobs throughout history. As shown by the recent advent of personal computers, technology creates much more employment than it kills over time, primarily outside the industry itself. Between 1970 and 2015, it is estimated that the personal computer industry in the United States killed nearly 3 million jobs while generating more than 19 million jobs in other sectors. As a result of this rise, the services sector, trade, and the emergence of new industries, such as the software industry, have experienced rapid growth[102].

[101] Jennifer S. Bard, "Developing A Legal Framework For Regulating Emotion AI", SSRN Electronic Journal, 2020, doi:10.2139/ssrn.3680909.

Acquiring such skills necessitates new learning techniques, which merit a separate paper, if not a sequence of research projects, meetings, and debates. Lifelong learning necessitates creative destruction, with the term "creative" being the operative word. The term "creativity" refers to the process of developing new meanings, relationships, goods, and markets. "The only thing that stops is fear itself," Franklin Roosevelt said in his inaugural speech in 1933, amid the Great Depression and misery. Being at ease with uncertainty is an integral part of any creative process, mainly when imagining a bright future.

8.1. Law & Artificial Intelligence:

Despite having proven shortcomings and prejudices, technological innovations are responsible for increasing decisions made by public officials in areas such as criminal justice, security and policing, and public administration. Without any vital transparency or regulation, facial recognition technologies are making their way into public spaces. Lawyers must play a more significant role in ensuring that new data and analytics systems are secure and accountable[103].

The vision of artificial intelligence dates back seven decades to the author's seminal article. However, AI has only recently been marketed and industrialised on a large scale, infiltrating every nook and cranny of our lives. Whether physical machines or software-enabled systems, these complex digital structures can reproduce and sometimes exceed human-level intelligence in areas including reasoning, sensory perception, pattern recognition, and autonomous action by combining statistics, computer science, and cognitive psychology.

For exemplary purposes, grand statements are made about the size and scope of AI's potential benefits and strengths. AI systems are outperforming humans in diagnosing certain cancers and have remarkable predictive abilities in various areas, including weather and forest fires. They could streamline administration in critical social services, such as identifying children at risk of violence or sifting through license plate photographs to prioritise readable photos for further analysis1. More streamlined crime data systems can also help prevent high-risk persons from eluding detection and gaining roles for which they should not be considered.

However, AIs, like any modern technology, have weaknesses, limitations, and unforeseen consequences, the list of which expands as the technology is implemented in society. Facial recognition software, which is used to search crowds for potential offenders, has a more challenging time recognising nonwhite faces. Face-rec raises the probability of increased detention or criminalisation of minority groups by increasing the possibility of false positives. Besides, there appears to be ethnic and minority bias in crime prediction, with increased surveillance in disadvantaged areas based on the previous law-breaking and incorrectly labeling minority groups as more likely to re-offend without credible proof of their accuracy or efficacy in preventing or deterring crime.

Take, for example, facial recognition, which is now in use in public spaces for protection and law enforcement purposes. According to the article, this "fundamentally reverses the assumption of liberty on which Traditional judicial culture has long rested," according to the report. "It is based on the idea that 'everyone is suspect, and the government has the right to monitor and classify individuals in real-time.' That, I believe, is extremely dangerous in terms of what it means for state-citisen ties, especially in a state built on commitments to democracy and individual liberty."

A second AI application rife with legal issues is crime forecasting and recidivism risk. According to a Pro Publica report into an algorithm-based criminal risk evaluation tool, black defendants were twice as likely as white defendants to be classified as potential offenders. White defendants were mislabeled as low-risk more frequently than black defendants. "We need to consider how we mass-produce decisions and process people, especially low-income and low-status persons, through automation, as well as the societal implications."

As enshrined in the European Convention on Human Rights, the right to privacy is also jeopardised by the use of face recognition in public, and the way that various AI systems depend on the processing of personal data must ensure that fundamental data protection rights are respected. Although many of these systems can increase individual and collective well-being, data protection laws must be adhered to. During the creation and testing of an app for the NHS, DeepMind, Google's AI team, for example, breached UK data security laws and patient privacy regulations. AI might infringe on these and other human rights in a variety of novel ways in the future. Even though the technology tends to violate the Geneva Convention, precursors to lethal autonomous weapons, which can independently identify and destroy human targets, are thought to exist in some military force advanced countries. Deep-fakes are computer-generated videos of actual people saying or doing things they did not say or do. They can be used for a variety of purposes, from promoting corporate bribery to politicians inciting abuse[104].

8.2. Importance of Law:

The author claims that laws and regulatory mechanisms will be able to cope with AI's emerging risks. For fully-automated judgments that process personal information, the EU

[104] Daniela Freddi, "Digitalisation And Employment In Manufacturing", AI & SOCIETY 33, no. 3 (2017): 393-403, doi:10.1007/s00146-017-0740-5.

General Data Protection Regulation, for example, includes provisions aimed at ensuring adequate legal protections for data subjects, including rights to disclosure, clarification, and contestation. Its data minimisation and intent specification principles are also required to reduce personal data misuse risks in the implementation and usage of AI systems.

Although still in its infancy, GDPR demonstrates that, rather than relying on business volunteerism and self-regulation, policymakers may impose regulatory restrictions on digital innovation. It indicates that the public interest can be protected without frightening digital innovators away. Its complexity will be explained and evolved as it is put to the test by lawsuits, investigations, and regulations.

"Because so many governments see technology as the solution to their economic problems, there is an unholy partnership between government and the tech industry," says one expert. "They argue that if we could only expand the tech industry, it will draw entrepreneurs, boost the economy, raise government revenue, and therefore improve everyone's well-being, so we should not control because it will stifle innovation." This, in my opinion, is one of the key reasons why the legislation has been neglected so far." Acting regionally will help businesses restrain their activities without causing them to abandon markets. No company can afford to overlook the European Union's population of over 500 million people with a relatively high income. "The GDPR shows that behaving regionally is justified and does not jeopardise innovation." It argues that AI threats should be measured against long-standing legal standards and accountability mechanisms. In civil and criminal cases, for example, motive and culpability are requirements. Since computers lack subjective awareness and intent, proving intent would necessitate concentrating on the human individuals who create or deploy AI for dangerous or especially hard.

In the AI age, there is also the legal category of negligence to remember. There is still a legal issue as to whether there was a reasonable attempt to predict harm when computational agents make decisions or act in ways that cause damage without any intent indicated by their creators. Technology developers will and should be held liable if they neglect to take reasonable precautions to prevent such "reasonably foreseeable harms." A similar field is device failure. If manufacturers release faulty goods that damage humans, they are legally responsible. Companies in the tech industry, especially in areas like driverless cars, where human injury and death have already happened, must be held to the same standards. This is particularly important at a time when an increasing number of vendors are joining sectors such as autonomous vehicles, smart grids, and connected homes, making accountability for failures much more challenging to create.

8.3. Artificial Intelligence (AI) Regulation:

Artificial intelligence is commonly used to model legal ontology. It has a significant role in legal informatics, which employs information technology in the legal system. The need to store and retrieve vast quantities of textual data is addressed by AI tools and techniques built in the context of legal issues, resulting in theoretical information retrieval and intelligent databases. The use of technology techniques such as machine learning, including deep learning and predictive analysis, and natural language processing (NLP) in law covers a broad range of subjects, including structured legal reasoning models. In multi-agent networks, computational models of argumentation, decision-making, evidential reasoning, and legal reasoning[105].

Law firms can produce due-diligence reports almost automatically thanks to AI and machine learning applications, saving time and money. Due diligence can be done quickly by

[105] Robert Hanna and Emre Kasim, "Philosophical Foundations For Digital Ethics And AI Ethics: A Dignitarian Approach", *AI And Ethics*, 2021, doi:10.1007/s43681-021-00040-9.

technology because most of it is a very mechanical process that can be performed by feeding in a collection of criteria and records. A reasonably good NLP can sort out and dissect the data. AI will take over 'mundane' legal tasks like checking contracts for favorable or unfavorable clauses, which can be performed more efficiently by a computer. It can also analyse documents, which is helpful because due diligence requires a high degree of completeness and trust in the standard of document analysis.

Another field where AI can help is legal analysis. Today, a judge spends a substantial amount of time examining the case and related situations that have arisen, determining the exact amount of damages, and evaluating prior decisions. With AI software, he can quickly locate a precedent, conduct a thorough review and comparison, and receive a likely decision, making his job a lot easier. AI apps will also help him hand down consistent sentences that minimise human biases, such as deciding if two suspects in identical circumstances should be punished differently. He may locate the most applicable cases or laws to apply in a specific legal situation. Efforts are also being made to develop algorithmic models that can predict case outcomes.

Contract review services powered by AI significantly assist legal teams in offloading the routine aspects of evaluating and redlining documents, allowing them to focus on more high-value work. AI will improve contract analysis accuracy, enable lawyers to take a much more data-driven approach to practice law, and make the legal industry more competitive overall.

Predictive coding comes in handy when it comes to discovery or pre-litigation disclosure. This coding is finding its way into transactional law, where it's being used to speed up document analysis in mergers. Small samples are used to cross-reference related items and weed out irrelevant documents, allowing lawyers to concentrate on the most critical documents. The

coding produces statistically verified results on par with or better than human review in terms of accuracy and, most importantly, rate. As a result, lawyers are no longer required to study manually, edit, and proofread contracts of hundreds of pages. Transaction contracts and increasingly sophisticated document processing systems use XML coding.

8.4. Artificial Intelligence (AI) as Legal Rational:

Algorithms are at the heart of AI, as we've seen in previous chapters. Humans can make these algorithms, or a computer system with adequate AI capability can build its algorithms to achieve the master algorithms' goals. We must be careful to predict how a computer could comply with its algorithm-supplied goals since a computer will always obey its algorithm-supplied goals. The most pressing near-term legal issue concerning AI, in my view, is who or what can be held responsible for wrongful, criminal, and contractual wrongdoing involving AI and in what circumstances. This is why it is essential to recognise the risks associated with an overreliance on AI and who can and should be kept accountable for implementing countermeasures to mitigate these risks.

Many people's lives have already been affected by AI. To fully comprehend what we mean when we speak about AI, we must first look at the business world, which is increasingly implementing AI-enabled technologies to improve efficiency and benefit. Perhaps the most valuable examples tend to be very small at first glance and are a long way from avenging artificial bits of intelligence. Goldcorp, for example, operates a "connected" underground gold mine in Canada that employs over 1,000 workers. The company achieved "real-time visibility, surveillance, and spectral analysis" over a wireless network that uses radiofrequency recognition to enable live tracking of people and equipment due to the introduction of multi-faceted technology. As a result, the organisation saves between $1.7 and 2.7 million in ventilation costs,

can find people 45 to 50 minutes quicker than before in an emergency, and can locate and monitor the equipment.

Sensors, compatible devices, and the data they generate are integrated with these operations to create a more productive and profitable company. The framework could, for example, redeploy miners to more efficient areas of the mine by integrating machine learning algorithms. Of course, if the algorithm was poorly built and trained, as we saw in previous chapters, these miners' safety could be jeopardised. For example, if the coder did not test the algorithm rigorously enough or introduced a bias into the method, or if the trainer has access to contaminated pools of data, the security of these miners could be jeopardised.

A judge planning to sentence an inmate might consult a digital report and recommendation powered by AI that predicts the likelihood of recidivism. Another example is the much-anticipated self-driving cars. If we assume entirely autonomous, self-driving vehicles, we might see: The user or passenger gets into the car and tells the driver where they want to go. To determine the most powerful, safest, and probably cost-effective path, the car's onboard computer communicates with different computers located elsewhere. While on the road, the car's sensors and those in other vehicles on, above, below, and near the street monitor progress, vehicle condition, and adherence to operational and traffic requirements. Mechanical and electronic functions and the status of the owner's necessary payments are all tracked and corrected in real-time. Police are no longer required to stop the car and may not even do so legally. Instead, they have total data access from the car, which is not being "powered" by a person, of course. Who is liable for the loss of a traffic violation? It would seem logical that those in charge of technology oversight are the ones to blame, but who are they? This will be

based on the origin of the oversight equipment, software, data, information sources, instruction transmission, etc[106].

8.5. Burden in Near Future:

AI technology will almost definitely be considered property shortly. An AI computer is unlikely to be found civilly or criminally responsible for any damage it causes. Instead, the main problem would almost certainly be civil liability under tort law. Whether or not the property is "intelligent," the owner or operator would be held responsible for any injuries caused by it. The leading causes of litigation will be product liability and negligence. While the law is simple in principle, given the Internet of Things and the impossibility of tracking the origins of data used by an algorithm, it may be challenging to implement in practice[107].

Consider a dam failure triggered by an AI control system that depends on thousands of sensors from multiple suppliers, data from third parties, many of which are obtained from other AI devices, and decision-making shared with other AI devices that are not owned.

In some ways, this opens the door to the classic tort suit: sue anyone. In practice, however, if a reasonably large amount of damage is caused, IoT distributed AI liability can be so large that it defies legal resolution. We cannot prove definitive fault or, if we can, proximate cause, even if we have a sufficient duty of care. To put it another way, the damage caused could have been unforeseen from a particular component manufacturer's standpoint. In a nutshell, the AI era begins with conventional legal principles being gradually extended to current and previously unanticipated situations, resulting in legal reform. Of course, this has happened before, but the AI era will not only be massive in scale, but it will also travel at a breakneck

[106] Ibid

pace. Our legal systems are reactive rather than proactive, particularly when we do not know what the future holds. According to one author, experts tasked with forecasting what New York City will look like a hundred years ago predicted that it would be demolished in 1880. The manure generated by the over six million horses required by the city's residents will render it uninhabitable. The modern internal combustion engine, as well as the automobiles it made, was inherently unreliable. It's conceivable that predicting the evolution of AI and associated technologies would be similarly futile[108].

8.6. Governance of Artificial Intelligence (AI):

Intelligence in synthetic form (AI), from the essential to the worldly ones like health care and humanitarian aid, permeates every corner of our culture. AI can improve economic, social, and human rights, such as the AI embodied in robot technology and machine learning techniques. The different sectors listed will benefit from these new technologies. At the same time, AI can either be misunderstood or act in an unforeseen way. Since the digital revolution is changing our opinions about values and goals, good behavior, and what innovations work and socially preferable are more critical than ever in terms of the role of law, ethics, and technology in regulating AI systems.

AI systems are used in various applications, mainly using techniques for statistically-based learning to identify patterns in vast data sets and decide on these patterns. Since AI in high-risk areas is increasingly prevalent, the pressures are mounting in a responsible, fair, and transparent way to design and control AI. This is one of the main issues discussed by the participants, including an in-depth analysis of AI governance regime ethics, legal-regulatory and technological challenges.

The AI systems are increasingly delegated to a general and risky procedure, such as speech grants, patient diagnosis, and financial transactions. This creates new issues, such as autonomous vehicle responsibilities, limitations to current law systems when dealing with the 'uniform effects of large data,' or avoiding algorithmic harm. Social justice concerns about the simplification of police departments or social welfare and, to mention a few, online media consumption. These critical questions can only be addressed effectively in a multidisciplinary way, given the AI's essential impact.

8.7. The Course of Action:

There is some excellent work on the controversial advances of machine learning research involving complex social constructs' conflation with simple statistics. Similarly, several scholars point out how the unrestricted use of "black box" technologies in banking, education, and criminal justice, as well as search engines and social services, can be harmful. Beer aims to draw attention to the "social influence of algorithms." He states that the algorithm's idea is used in culture "as part of the discursive reinforcement of unique norms, methods, and modes of reasoning." As previously mentioned, AI governance is influenced not only by how AI systems function but also by how they are perceived and imagined. The following paragraphs would illustrate some questions and encourage a closer examination of the cultural rationale advanced by allowing businesses to influence the debate actively.

Many of the world's leading AI companies are located in the United States. The degree to which AI systems mimic communities in the image of US culture and American tech behemoths' biases is an apparent source of concern. AI programming does not often necessitate a significant amount of computing power. The data it contains provides a substantial portion of its meaning. As a result, a limited number of American companies dominate technological innovation. Since these businesses are at the forefront of numerous regulatory reforms, this issue must not get worse. An agenda guided by corporate needs in the United States is not a natural match for the rest of the planet. The EU, for example, has somewhat different privacy laws than the United States. But this is not the only issue to be concerned about.

AI systems are often portrayed as complex and difficult-to-understand "black boxes." These points, according to Kroll, obfuscate the fact that algorithms are essentially understandable. He claims that "rather than dismissing systems that produce undesirable

outcomes as inherently inscrutable and therefore uncontrollable," "we can mark the application of insufficient technology as malpractice, performed by a system's controller." Nonetheless, the 'complicated inscrutable' technology's cultural rationale is often cited to explain the AI industry's close participation in policy-making and regulation. The business actors in these policy processes are the same elite community that dominates the web marketing and data collection industries. This is not an accident. Big data sets can be gathered by companies including Google, Face book, and Amazon, which can drive new AI-based services. As a result, the 'shift to AI' enhances big companies' marketplace while also legitimising their participation in regulatory processes.

Another issue to consider is the power that corporations wield over AI law. They serve as semi-co-regulators in some situations. Following the Cambridge Analytica controversy, for example, Facebook's CEO testified before the US Senate Commerce and Judiciary Committees regarding his company's involvement in the data breach. Several Senators specifically asked him to include examples of what his business legislation might look like during the hearing. Similarly, the European Commission recently established a High-Level Expert Group on Artificial Intelligence. The group's mission is to cooperate with the Commission on the establishment of a European AI strategy. The group's 52 members come from various backgrounds. While not all affiliations are apparent, it seems that nearly half of the members work in business, 17 in education, and just four in civil society. In this question, Marda emphasizes the importance of involving civil society, which is often closest to those affected by AI systems, in creating AI governance regimes. She demonstrates that the current debate in India is primarily concerned with governmental and business interests and the objectives of progress and economic development at the cost of social and ethical issues.

The critical examination of the relationship between new technologies such as AI and human rights, democracy, and the rule of law must therefore begin with a comprehensive review of the reality of business and technology models as they currently exist. Including the concentration of technological, economic, and political power in the hands of the "frightful five," who are at the center of the development and systems. The industry's impact can also be seen in developing several large-scale global projects on AI and ethics. Open norm-setting platforms that aim to resolve AI governance by establishing technical standards, ethical guidelines and professional codes of conduct have clear benefits. On the other hand, the proposals proposed have the potential to go beyond existing voluntary moral structures or broadly specified technical conceptions of justice, accountability, and transparency. The numerous articles on this topic show why it is essential to continue to discuss issues of complicated regulation and the internet's advertisement and publicity business model. If we are concerned about AI governance, we must address these issues holistically.

This article's statement should not be interpreted as a rejection of the industry's efforts or the importance of existing legal, technological, and regulatory AI governance structures. Instead, we can learn a lot from this ongoing work if we carefully evaluate its goals, effects, and mechanism. It's important to remain skeptical of AI governance solutions' underlying objectives and the (unexpected) cultural consequences, particularly when it comes to legitimising private-sector-led norm creation around ethics, standards, and regulation. Similarly, we must be aware of the issues that are not, or just partially, addressed by terms like justice, responsibility, and openness. What is not addressed when reflecting on these issues? Are we saying that these well-known abbreviations automatically cover topics like AI and equality, social justice, and human rights? Or are these issues beyond the purview of the groups driving the agenda? The value of

raising these tough questions stems from the fact that these principles are gradually being integrated into regulatory initiatives worldwide.

8.8. Advantages of Artificial Intelligence (AI) in Regulation:

AI is a big step forward in allowing even a layperson to conduct a thorough search of technical legal issues using the appropriate keywords. This search offers straightforward answers to tough legal questions. However, going beyond quest based on the ML model is the role of a legal professional, as is interpreting a judge's findings. A good lawyer may determine whether a paragraph in a judgment is good law or binding law or whether another judgment has overruled it. ML may potentially help distinguish related sections and criteria in other decisions based on this.

The legal profession faces a host of prominent concerns that AI can assist with. Legal practice necessitates a significant time commitment and strict deadlines. According to science, long work hours are one of the most important contributors to poor mental health among lawyers. AI has a much greater knowledge base and can review thousands of documents that a professional human eye would overlook. Companies in the legal-tech field have developed technology that lets lawyers easily recognise clauses in contracts, making the tedious and monotonous task far more productive and quicker. Several high-volume, recurring activities, such as identifying words in a series of documents or filling out other forms, are automated by AI, diverting lawyers' attention away from more critical work.

AI helps companies to produce more work in less time, enabling them to improve productivity. When AI has completed its creation, the lawyer will quickly review it and introduce it to the client in an understandable format. AI strengthens a lawyer's capacity to concentrate on

reasoning, presentation, and client discussions rather than struggle and mundane tasks. AI also calculates the likelihood of the argument's success. This helps the prosecutor to present the most pertinent facts in court.

If legal professionals are afraid of losing their relevance due to incorporating technology, they will only be missing out on the global legal revolution. They do not need to be concerned about technology because it will not result in job loss. AI will never replace lawyers, and the legal industry will still require human resources. AI technology frees up time for legal professionals, allowing them to focus more of their skills and brainpower on the more complex and demanding aspects of their careers. It broadens lawyers' role from risk reduction to greater involvement on strategic projects, freeing up their bandwidth to concentrate on various and more nuanced or practical styles of work. AI serves as a facilitator in the development of more brilliant lawyers and the efficient management of issues such as legal costs and pendency. Human-machine interaction is critical: attorneys can pitch in the first place by finding clauses in per-existing contracts so that AI can detect similar ones in the future. Cases can be manually classified under different headings before algorithms are extracted from such databases.

CHAPTER: 9

Inclusion, and who is Left Out?

Human prejudices have been well documented, varying from unconscious association measures to reveal partialities we may not be aware of in field studies, which show how often these prejudices affect results. In recent years society has been struggling in such a way that harmful human beings can infiltrate and cause damage in artificial intelligence systems. Awareness of and work to minimise these threats is urgently necessary when many companies seek to deploy AI systems all across their operations. Since a German medical school has previously been discriminatory by the UK Racial Equality Commission, it is not recent. The software used for candidates' choice for interviews was shown to be inclined towards women and non-European names. On the other side, the software was expected to cater 90 to 95 percentage points to human admissions decisions. Besides, the school enlisted more than any other clinical school in London than any non-European student. The use of an algorithm did not eliminate any preference for human choice. On the other hand, the return of human decision-makers does not solve the problem.

Algorithms have become much more sophisticated in the intervening thirty years, but we still face the same problem. Human biases can be detected and minimised with AI, but it can also intensify the issue by baking in and implementing preferences at scale in critical application areas. For example, a criminal justice algorithm used in Broward County, Florida, mislabeled African-American defendants at nearly twice the rate it incorrectly labeled white defendants, according to the investigative news site ProPublica. Other research has discovered that training machine learning models on news articles will contribute to gender stereotypes being displayed.

We are all responsible for bias. Of course, prejudice damages those discriminated against, but it also harms everyone by restricting people's opportunity to engage in the economy and community. It stifles AI's ability in business and society by instilling distrust and delivering erroneous performance. Business and corporate leaders must ensure that the AI programs they employ improve on rational decisions, and they must promote advancement in AI testing and standards to eliminate bias.

The growing academic research into AI biases gives rise to two intervention imperatives. Firstly, AI needs to be used wisely to make a variety of ways to make conventional human decisions. The data available for machine learning systems are not ignored by factors that do not accurately predict results. On the other hand, people may be lying about or even unaware of the factors that lead to a particular candidate being hired or rejected. Test algorithms for bias may also be more straightforward and may reveal unnoticed or untested human prejudice. Deep learning patterns are unfathomable, but the ultimate "black box" is the mortal mind. In conclusion, as researchers Jon Kleinberg and others put it, AI can help historically disadvantaged groups to improve judgment, as they call the "deployed advantages of better forecasting."

The next challenge is to step up progress against AI damage. Here are no easy corrections. The most obvious step is also to decide what constitutes "fairness." one of the most challenging steps. Researchers have invented technical fairness concepts that require models to have the same predictive power in each group or to have comparable false positives rates. This, however, poses a significant problem: different definitions of fairness usually cannot be met at the same time. As fairness constructs and metrics grow, researchers have advanced several strategies that enable AI systems to reach them, including pre-processing data, subsequent alteration in system decisions, or integration of fairness concepts into the process of learning

itself. Counterfeit equity is a promising strategy to ensure that a model's choices are the same in an untrue environment where sensitive features such as ethnicity, gender, or sexual preference are affected. Authors have also developed a systemic approach to the treatment of complex cases of counterfactual justice. There are specific pathways in which the sensitive characteristics affect outcomes, whereas others are considered unfair. For example, the model can be used to ensure that entry to a specific university department does not impact gender but also to enable the university to differ in its overall gender admission rate if female students decide, for example, to apply to more effective departments.

Other problems, such as how to assess whether a system is reasonable enough to be published and in which circumstances a fully automated decision-making process should be permissible at all, require more than technological solutions. These questions necessitate a multidisciplinary approach, with ethicists, social scientists, and other humanities thinkers contributing.

Finally, put more money into diversifying the AI field. A more diverse AI culture will be better able to predict, study, and detect bias and involve impacted groups. This will necessitate educational and opportunity investments. BI5BLL, a nonprofit dedicated to building an open and multicultural pipeline of AI talent under individuals and communities and mentorship, is one example. AI has many potential benefits for industry, the environment, and society's most critical social issues, such as human biases. However, this would only be feasible if people assume these structures will yield objective results. AI will assist humans in overcoming prejudice, but only if humans collaborate to combat bias in AI.

9.1. Artificial Intelligence (AI) in mitigating bias to Increase Inclusion:

Researchers and practitioners are paying more attention to the value of Inclusion as our awareness of the essence, and consequences of diversity grow. Inclusion has been perceived as distinct from, but similar to, variety in the last decade. The definition of inclusion-exclusion, for example, was developed to discuss exclusion as a significant concern in a diverse workplace. Inclusion exclusion refers to a scale of how much a person feels like he or she is a member of the organisation, both formally in terms of access to data and decision-making and informally in terms of social gatherings, lunch meetings, and so on.

A more recent and widely recognised perspective on Inclusion focuses on an individual's two basic countervailing needs: a need for identity and individuality. Individuals aim to balance their desires for similarity to others and their needs for individuality through an appropriate degree of Inclusion, according to the optimal uniqueness theory (ODT). A sense of Inclusion in a workgroup is generated by a simultaneous sense of individuality and belonging when working together. Given this, Inclusion occurs when a person feels appreciated and respected in the workplace and has a sense of belonging while retaining his or her individuality. Today, it is commonly accepted that cultivating an inclusive community helps people to resolve the complexities of diversity while still reaping its potential benefits. Individuals in an inclusive community have equal access to knowledge and services, engage in collaboration, and make decisions. Inside the work community, they are all viewed as 'insiders' while retaining their distinct personalities. Creating an inclusive environment for a diverse workforce offers a variety of significant advantages:

- Raise the number of people who have access to the expertise they want.

Organisations should include all applicants, regardless of gender, age, ethnicity, or other

factors, by incorporating D&I into their hiring processes. This increases the talent pool of potential applicants, giving companies more chances to recruit top talent and fill ability gaps. Furthermore, companies will benefit from increased competitiveness and adaptability to fast-changing markets as different people bring unique understanding and experiences that foster innovation and enhance problem-solving.

- Enhance the organisation's image. A more diverse workforce and an inclusive community will change how a company is perceived. According to research, having a diverse board of directors improves a company's image and positively impacts consumers. Furthermore, a positive image makes a company more appealing to talent concerned with diversity and Inclusion. Women and ethnic minorities, for example, find organisations that encourage diversity to be more desirable as potential employers.
- At the very least, maintain conformity. The bare minimum that a company can do is comply with Equal Employment Opportunity (EEO) criteria. A successful D&I program goes beyond EEO classifications like age, gender, and ethnicity to include personal characteristics (e.g., personality, attitudes).
- Improve the customer experience. Customer satisfaction has been related to a diverse organisational environment. This may be due to a diverse customer service department having a greater understanding of various customer demands and therefore being able to serve those customers better.

Conscious and unconscious prejudices, also known as overt and implicit stereotyping, a type of cognitive bias, have a strong negative effect on structured employment decision-making processes and an employee's everyday work life, and organisations receive revenue from a more

open and multicultural workplace should be aware of the impact. As a consequence, prejudice is a subject that HR needs to pay attention to.

Bias may harm decision-making in the employee lifecycle, including recruitment, recruiting, promotion, training, performance appraisal, compensation, and even termination. Such instances are as follows:

- Job descriptions can include bias. According to research, job advertisements in men's fields (e.g., electrician, engineer) use more masculine language than job advertisements in female-dominated areas (e.g., competitive, dominant) (e.g., nurse, early childhood educator). As a result, women tend to find these more male-oriented work listings less appealing.
- Selection systems are prone to bias. According to research, white applicants with similar resumes earned 36 percent more work callbacks than black applicants and 20 percent more job plot points than Latino applicants. Furthermore, an experiment showed that applicants with non-productive disabilities obtained 26% fewer responses from employers to their work applications than non-disabled applicants with similar job applications except for disability. We would not expect such gaps in job application responses if all workers were handled fairly and without prejudice.
- Studies show that people prefer to describe great employees in masculine terms and that "typically masculine qualities" are defined as necessary for becoming an effective boss, even when the managers are not aware of it. Although this is only one example of gender inequality, it is well recognised that women are less likely than men to receive promotions. Despite asking for promotions and negotiating salaries at the same pace as

their male counterparts, McKinsey and Lean In noticed that entry-level females were 18 percent less likely than men to be promoted to manager.

9.2. Artificial Intelligence (AI) to Mitigate Bias:

Machines, unlike humans, do not have prejudices that hinder diversity and Inclusion. Somewhat, they are limited by the data and algorithmic features selected by the people who created them. When AI is adequately developed and implemented, it can eliminate the characteristics that lead to biases and learn how to detect possible biases, especially unintentional and difficult-to-detect biases in decision-making processes. Following identification, AI will notify HR or managers of the biases' existence. In short, if AI is carefully constructed, it has a lot of potentials to help with intolerance. AI can make a huge difference in two areas: ensuring that all eligible applicants have equal access to work opportunities and assisting HR and managers in making fair hiring decisions.

9.3. Equality in Opportunities:

Making career opportunities available to a diverse pool of eligible applicants is the first step toward growing workplace diversity. Job seekers must be aware of job opportunities to which they can apply, and job requirements must inspire (rather than discourage) a wide variety of people to use.

- Achieving fair access to work opportunities begins with equal knowledge of jobs available. As per information asymmetry theory, there are information differences between job seekers and potential employers in the labour market. By proposing positions that work seekers may not have considered for themselves using conventional job search mechanisms, AI can raise awareness of opportunities. Instead of relying on

keyword searches powered by the job seeker, a technology designed to connect with applicants and learn about their skills and preferences will match those qualities to job openings. As a result, AI can expand the talent pool and boost diversity and Inclusion in both internal and external recruiting.

- If a job applicant is aware of a position, the job posting will imply whether they are qualified. In reality, a job posting is often the first way a prospective employee learns about a company. Writing the ideal work posting that accurately reflects a company and the job while still attracting the best-qualified applicants and maintaining a diverse applicant pool can be difficult. Until they appear in front of prospective applicants, AI-enabled work posting analysis technology can detect prejudice in draft advertising. The AI technology can see gender, age, and ethnicity-biased language in job postings, allowing for rewording to cater to the broadest range of eligible applicants possible. To minimise prejudices, AI can also enhance work postings by offering feedback on sound, speech, and duration.

Furthermore, research indicates that men are more likely to apply for a job if they feel confident in any or all of the listed skills, while women are less likely to submit unless they come prepared in all of the listed skills. AI technology will help with the length of skills and competencies across occupations, ensuring that work postings only have the position's skills.

9.4. Making Reasonable Decisions:

Part of the problem is solved by eliminating or mitigating prejudice at the candidate attraction and recruiting periods. However, decisions about people are taken during the work lifecycle, with immediate and long-term consequences for an individual's well-being and livelihood. Bias can occur in these decision-making systems, as well as the means to resolve it.

- Hide job-inappropriate clues in applicant results. Hiring managers rarely have complete knowledge about work candidates during the hiring process, so they rely on applicants' and CVs' indications and cues. Personal characteristics such as race and age are examples of signs and cues that can contribute to prejudices, skewing hiring managers' decisions. Hiring managers may not know it, but they may underestimate or underestimate a candidate's skills and abilities without realising itlineshiring managers in an advertising agency, for example, could de-prioritise all older candidates because they believe they are less capable of doing the job. In this case, AI trained with suitable algorithms will recognise and suggest eliminating or replacing any terminology that can lead to biased conclusions with neutral words (e.g., indicators of age, gender, and ethnicity). AI solutions may also include a blind, impartial ranking of applicants by comparing their skills and expertise with job posts, regardless of age, gender, or ethnicity. As a result, companies can not only shorten the time it takes to recruit by relieving hiring managers of tedious resume processing, but they can also ensure that any initial applicant assessment and rating is free of prejudice.
- They are identifying and reducing bias in the talent lifecycle. AI-enabled solutions, such as an adverse impact analysis tool, can identify possible discrimination among various groups and provide analytics to HR during decision-making phases in other areas of HR practices, such as promotion, incentives, and termination. If an adverse effect is found, companies would most likely want to minimise it, and AI-enabled solutions will assist in areas like promotion by offering transparent and impartial access to job pathing opportunities.

To gain insights into employees and tasks, AI solutions use information, problem-solving, and natural language understanding. AI-enabled technologies will recommend appropriate positions for workers that they might not be aware of by matching their expertise and experiences with the skill needs of organisations. This will aid in increasing internal mobility within the business. Previous research has found that filling open vacancies internally is less costly than onboarding new talent. Internal hires are more likely to get up to speed and perform much better than external hires. AI systems may also include personalised learning recommendations, helping workers to strengthen their skills over time. Employees can feel a sense of belonging due to perceived career and ability development opportunities, which is an essential component of Inclusion.

Despite AI's great potential, one out of every five HR managers surveyed is worried that it would reinforce or even worsen prejudice in recruiting and talent growth. Their concern is understandable, given the recent news about discrimination in AI software, such as some AI-based recruiting tools showing biases towards specific categories of job applicants. Artificial intelligence is judgment-free at first, but it depends on data gathered and chosen by humans, and it is trained using human-created machine learning (ML) algorithms. Given that the creation of AI solutions necessitates human decisions, such as how data is obtained and what examples to use to train the machines, it is essential to evaluate datasets and model outcomes for bias regularly and make appropriate adjustments.

9.5. Artificial intelligence (AI) Bias at Workplace:

Algorithms are being used in almost every aspect of life, and big data is constantly being used to help personnel decisions: the buzzword is "people analytics." Employers can make better HR decisions and operate their companies more effectively with technology that gathers,

processes, and interprets people data. To put it simply, people analytics is the use of digital methods and algorithms to analyse data about or relating to people, even by profiling, to gain "actionable insights." Via improved efficiencies, cost savings, and risk mitigation, these "actionable insights" can allow an organisation to enhance its personnel management processes and organisational capabilities. This method of data analysis has become an essential part of people management in recent years. There are many people analytics tools on the market that process, link, and analyse massive quantities of data to provide actionable insights.

Given the various advantages, there are many legal risks associated with using such technology. Before introducing any people analytics software, employers should make sure they've solved these issues. The use of biased algorithms, especially in hiring, is one of the significant risks. Algorithms are constantly being used to choose candidates for open positions. They speed up the application process by assisting with pre-selection and reducing the amount of time spent reviewing applications. At first glance, this use of technology and AI-powered systems seems to add more 'humanity' to the selection process by reducing latent human prejudices (e.g., against minority ethnic groups). Algorithms, on the other hand, maybe 'biased' and therefore discriminate against candidates.

Google images with a standard internet search engine will quickly reveal if an algorithm is discriminatory. This internet search engine employs algorithms to locate pictures that fit the search term entered. When you search for 'CEO' or 'professional haircut,' the first images that come up are of men. Pictures of women appear while looking for the words 'assistant' or 'unprofessional haircut.' There is a chance of gender discrimination if an employer's online application portal's algorithm tests applicants' CV images in a similar way and sorts out applicants with "unprofessional" photos.

An incorrect database or a model error may also trigger such ‘bias' in algorithms. Inaccurate training data is fed to the algorithm, resulting in a flawed database. Suppose a tool for selecting candidates for training purposes analyses previous hiring processes of an organisation that recruited men in the past primarily. In that case, the algorithm can "know" this and will favor male applicants in the future. On the other hand, a model error may be induced by the programmers' biases, which are expressed in the algorithm, or by an algorithm that classifies a simple correlation as cause and aligns subsequent decisions with it. Correlations can be helpful in data analysis, but they can also yield ludicrous results: for example, there is a 99 percent connection between US government spending on research, space, and technology and suicides by hanging, strangling, and suffocation on the one hand, and suicides by hanging, choking, and suffocation on the other. There appears to be a 99 percent link between Maine's divorce rate and per capita margarine consumption.

For instance, as part of the application process, several businesses administer online personality tests to candidates. In 2011, a drugstore chain in the United States was sued for discrimination over the personality test is used. Applicants had to agree with statements like "people do a lot of stuff that make me mad" and "it's no use getting close friends – they just disappoint you" in the personality exam. The plaintiff alleged that the test could discriminate against applicants with such mental disorders or disabilities. In 2012, the father of a person with bipolar disorder lodged a lawsuit with the Equal Employment Opportunity Commission, alleging that the personality test used by a supermarket chain discriminated against his son. Applicants were asked to agree (or disagree) with statements like "you're still happy" or "you do not have any concerns" in the personality survey. The use of such personality tests has been linked to a

risk of disability discrimination. If emotional moods are assessed as part of a personality test, applicants with associated illnesses can react in a way that the algorithm finds unfavorable.

Another recent example is Amazon, which had to halt a recruitment effort because it reportedly, although unwittingly, discriminated against women. The company had created software for the project designed to pick the best candidates from hundreds of applications by comparing them to job-related keywords. With widespread applications from current employees, the program was fed and educated. However, as is typical in the technology sector, the company's workforce is predominantly male. As a result of the program realising this and deciding that men were better suited, women's applications were filtered out, posing a significant discrimination risk.

The General Data Protection Regulation, which took effect in May 2018, adds to algorithmic transparency by requiring algorithmic decision-makers to disclose and explain their actions and minimise any negative social consequences or possible harms. New York City has established the first Automated Decision Systems Task Force in the United States to seek accountability and transparency in using algorithms in city government.

On the other hand, organisations must continue to track the technologies used in their knowledge management ventures to demonstrate that they are not biased at all times. Algorithms should ideally be used to aid decision-making while also allowing for adequate human oversight to control this particular danger. Some providers have already recognised the risk of discrimination and built software solutions to remove any unjustified differential treatment, such as statistically testing algorithms for existing "biases" and modifying them as required.

Given its ability to eliminate prejudices and apply objectivity to employment decision-making, AI offers significant potential for creating more diverse and inclusive workplaces. However, if AI solutions are not properly designed, they can produce biased results that damage D&I. When it comes to using AI in HR to improve diversity and Inclusion, there are three main steps to take:

- For AI to be prepared, it is essential to recruit professional cognitive psychologists and data scientists. In model construction and algorithm development, data scientist bring their skills to minimise prejudices in models and algorithms. To ensure that the data used in a trainer is free of prejudices and fulfills EEA requirements, I-O psychologists bring in their know-how in data collection and legal requirements; data analysers gain their skill in models and application development to reduce distortions of model algorithms. An IA-enabled framework that can be used across role, framework, and geography to provide a consistent and impartial benchmark for assessing employees and job applicants may provide simple, core leadership and technical capability and skills criteria and qualifications.
- Biases can occur in both data collection and algorithm development. It's crucial to start with a high-quality dataset, then test for and minimise bias in the data before feeding it to the AI system. The algorithms' outputs should also be tested, and model features should be modified as needed to minimise bias.

CHAPTER: 10

Adopting AI practices of Japan as an Appropriate Model

AI governance, or how systems with AI as an aspect, AI services that make the systems accessible, other related services, and developers, users, and service providers should be governed, has been a subject of discussion worldwide. In Japan, the AI Strategy, which was updated based on follow-ups this year. The Integrated Innovation Strategy 2020 asks related ministries to "discuss ideal approaches to AI governance in Japan, including legislation, standardisation, guidance, and audits, conducive to Japanese industry's competitiveness and increased social recognition, to operationalise the AI Pledge," according to the AI Strategy 2019. Similar debates have taken place in Europe and the United States, where basic policies and more complex legislation on AI systems have been debated and written. The Global Alliance on AI, which was initiated in June 2020, is an international initiative to bring the OECD AI Principles into effect[109].

Though there is a lot of talk about AI governance in Japan and globally, designing AI governance is complex. On the one hand, some may assume that horizontal regulation can fix issues relevant to AI, such as the inability to clarify. On the other hand, since AI is a flexible technology that can be applied to a variety of fields and uses, the solutions to the issues can be sector-specific or use-case-specific. For governance to be successful, it is also necessary to discuss new monitoring and compliance mechanisms. We must organise this multi-layered and dynamic governance while avoiding impeding innovation and addressing AI systems and

[109] Susanne Anker, "Correction To: Epistemic Practices In Bio Art", AI & SOCIETY, 2021, doi:10.1007/s00146-021- 01181-5.

services concerns. Furthermore, in the with/post-COVID-19 environment, the creation of AI governance that can be involved vertically in digital transformation promotes digital technologies. Without experts from different fields, we will be unable to solve the urgent problem of AI governance without the expertise and experience of experts[110].

10.1 Artificial Intelligence & Social Cultural Issues:

Robots perform routine tasks as part of the global production line, such as filling boxes or solving a car frame. But what if robots can move beyond their limited set of tasks and start solving problems under more complicated operational circumstances, such as identifying a failure in the assembly line or identifying an improved compound?

And how can "deep learning" robots, with algorithms that learn from large volumes of data gained by experience, start to exchange ideas with other robots, boost innovation in various settings, from storage facilities to self-driving cars on the way to early diagnosis and discovery of drugs in health centers? These issues are addressed by Favored Network, a state-of-the-art artificially smart enterprise established in 2014. The Tokyo-based company is approximately $2 billion, according to CB Insights. It is a sign that AI and robotics are crucial in solving social problems and attaining new economic development, the effective development innovation program of Japan[111].

The solution-based approach for Japanese companies is critical in the highly competitive field of AI technology, dominated by U.S. and Chinese-based firms with billions in funding. "We've been saying from the beginning that our business will focus on real world issues, not

[110] Ibid

[111] Serdar Aydin and Begüm Aktaş, "Developing An Integrated VR Infrastructure In Architectural Design Education", Frontiers In Robotics And AI 7 (2020), doi:10.3389/frobt.2020.495468.

virtual issues," he says. "The consistent strategy and attitudes and consistent achievements of our partners are strongly respected."

The latest announcement by Preferred Networks of collaboration with Toyota illustrates Japan's focus on AI and its deep learning to address immediate issues. The objective of the project is to develop service robots for everyday life for people. In Japan, this is a vital necessity. A growing population and a strong labour market make it difficult to ensure that older adults have adequate home and healthcare resources. The two companies will work with Toyota's Human Support Robot (HSR), a platform that allows robots to work with individuals in the field of care and long-term care, offering critical care and support. It has one arm, monitor, cameras, and a rolling base and can automatically collect and collect objects and provide central processing and automation.

This kind of creativity can help resolve many of the issues facing the company in Japan – and in the Japanese cabinet Secretariat around the globe, Innovation Policy. The authors describe Japan as being on the move quickly as adding an 'ultra clever chapter to the four previous stages of development: hunter collectors, agricultural, technological, and information. Japan focuses on assisting companies in the development of new and creative solutions, including startups and "hidden gems" among small and medium-sized enterprises, in society 5.0, where everything is connected to and interlinked through technology.

Japan was a pioneer of disruptive, revolutionary technology like portable computers, the Sony Walkman, and LED lights, once the world's third-largest country. As Silicon Valley and Chinese developers began to pursue IoT, big data, and AI, Japan fell behind. The author believes that Japan is well placed to accept AI and advantage from its solutions with so many problems.

Government and university programs devoted to IA are on the rise in Japan as well as in France, with a wide variety of subjects being investigated. A monthly seminar on the implementation of an AI-based information communication network system has been held by the Minister for Interior and Communication since 2016. The "Strategic Council for AI Technology" was established to promote AI study and societal implementation under the Prime Minister's leadership[112].

Besides, the Council includes other ministries such as the Cabinet Office, the Health Ministry, the Ministry of Land, the Ministry of Agriculture, and research organisations. The Japan Science and Technology Agency (JST) and the New Energy and Industrial Technology Development Organisation are planning AI-related projects.

In 2017, the Japanese Cabinet Office published a study on Ethical, Legal, and Social Issues (ELSI) posed by using AI and socio-economic issues such as work style change and jobs. Since August 2016, the Ministry of Economy has been debating the creation of a policy plan titled "New Industrial Structure Vision" and has released a study titled "Future Vision towards the 2030s" to recognise and overcome societal challenges by using technological technologies such as IoT, big data, AI, and robots. The importance of reorganising industrial and employment systems and personal training is also stated in the study.

Since 2014, several academic organisations and commissions have been created. The Ethics Committee of the Chinese Society for Artificial Intelligence (JSAI), for example, was founded in December 2014, and it consists primarily of academics but also of AI specialists. The JSAI Ethics Committee's mission is to explain the current state of science, predict future risks

[112] Ibid

and benefits from AI, and address ethical concerns for AI designers and users. Young social science researchers created the think tank "Acceptability Knowledge with Responsibility (AIR)" to facilitate a multidisciplinary dialogue on ethical, legal, and norm issues, as well as AI accountability.

The Robot Low Study Group, which was established in 2016 and is made up of scholars, engineers, experts, and law students, offers a forum for sharing and exchanging information and ideas about the legal structure for the use and creation of robots. Since 2015, the AI & Society Meeting has brought together scholars, artists, and public officials to address AI's social effects from philosophical, technological, legislative, political, and sociological perspectives.

Based on the preceding observations, it is apparent that significant changes can occur at various levels across our lives. The advent of a hybrid human-technology-based society appears to be on the verge of becoming a reality. Although Japan has historically been internally focused, it is now open to collaboration’s and co-creation to build this new advanced Society. Given the projected growth of the AI sector, now appears to be a good time to invest. All of these results point to a potential window of opportunity for AI-based companies, start-ups, academics, and investors. Japan may be a fascinating partner to further your AI progress, depending on the specific skills required. The Japanese government and many industrial sectors, for example, are driving expertise in software development and product enhancement. Understanding Japanese culture, investing time in building confidence, and supporting a healthy partnership between Dutch and Japanese initiatives are necessary to become an exciting partner.

There are many flaws in Japan's AI environment. First and foremost, Japan's ability to have enough qualified workers to keep up with AI innovations on a global scale is being strained

by its shrinking workforce. This shortage of skilled domestic workers is not solely due to Japan's low birth rate but also has origins in the country's education and corporate culture, among other factors. Japan has recognised that versatility, imagination, and solving problems are needed to keep up with rapidly technologically advanced social trends and is currently upgrading its educational system. However, the workers that will benefit from this new structure will not be available until 2030. At the moment, these abilities are rarely cultivated in the workplace. The weaknesses of the professional workers are also expressed in software development flaws. Whereas software is thought to account for most AI worldwide, Japan puts a greater emphasis on hardware. To develop (hardware) goods and compete globally, the software is becoming increasingly relevant. Since software and AI are so closely linked, Japan's hardware-centric reputation could restrict potential collaborations. Finally, due to the limited size of Japanese journals and conference proceedings, Japan's universities have decreased their global AI position.

10.2. AI Challenge for Japan:

In the sense that Japan tends to use its own domestically produced technologies and services, the Author can be loosely translated to self-sufficiency or protectionism rather than co-producing expertise. While Japan is actively pursuing collaboration’s, it is prudent for a business partner to be aware of this concept in the future. During the partnership, the Author can affect information sharing or related topics such as facilities or staff. Second, Dutch businesspeople should be mindful that building an alliance with their Japanese counterparts would take time and effort. Before you are allowed to join the relationship, you must devote sufficient time and energy to developing faith in the person. Be mindful that English is not as widely spoken as it is in New Zealand and that the Japanese language is not commonly spoken in Europe. Although

modern technology, in which AI plays a key role, helps bridge the language divide in specific ways, computers cannot understand cultural sensitivities. A further stumbling block is the lack of privacy and AI implementation regulations and is still in the works. Companies can face difficulties due to this, as it is difficult to foresee the course of upcoming regulations. Collaboration between the Japanese government and companies is needed, which can result in delays[113].

Last but not least, Europe does not lead the way in AI. Although we must share common values, Japan might be more interested in the latest AI developments in the United States and China. New Zealand needs to improve its exposure and branding concerning AI-specific skills.

10.2.1 COVID-19 Prevention:

When it comes to the adverse effects of COVID-19 on Japan's AI policy, the focus areas of competitiveness and mobility are likely to be the most affected. A near-complete halt in foreign trade exacerbates the current unpredictability. Border constraints and uncertain supply chains have far-reaching and long-term negative consequences for the global economy, affecting both production and demand.

While Japan's recent economic outlook had improved since the end of May, when the state of emergency was lifted, progressively rising socio-economic activities, the current infection outbreak could be a setback. For the first quarter of this year, the Japanese Cabinet Office recorded a 3.4 percent drop in GDP, a 6% drop in exports, a 0.5 percent drop in corporate investment, and a 0.7 percent drop in personal consumer investment. In June, the number of people laid off rose by 4.62 million from April to 6.65 million. Long-term forecasts indicate that,

[113] Ying Jiao Shao et al., "Cost-Effectiveness Modeling Of Repetitive Transcranial Magnetic Stimulation Compared To Electroconvulsive Therapy For Treatment-Resistant Depression In Singapore", Neuromodulation: Technology At The Neural Interface 21, no. 4 (2017): 376-382, doi:10.1111/ner.12723.

despite being a prosperous economy, the world's sixth most competitive country, and a member of the G7, Japan will undergo a sluggish economic recovery, returning to its 2020 production level only by the end of 2025. This may be the worst economic downturn since records started, surpassing the global financial crisis of 2009. While Japan's well-planned AI strategy from 2020 to 2025 is based on relatively stable long-term trends, it is clear that the context in which AI will be introduced in Japan has changed due to the pandemic[114].

Although most people would see COVID-19 as harming the global economy, Japan's ICT exports increased due to the strong demand for 5G and data centers. The possibilities offered by a wide range of AI technology have piqued people's interest. The Japanese government is currently preparing to spend more of its R&D budget on core technologies that will benefit Society 5.0, including AI. As compared to the AI strategy, these advances suggest that the virtual component of the mobility pillar, such as connectivity, and the fitness, medical care, and welfare posts, are being boosted. The virtual mobility and communication aspects of AI technologies are listed here, as will the latter in the following paragraph.

Telework is the first field of AI incorporation in Society. Despite the government's support for normalising teleworking to relieve traffic congestion over the past year, Japanese companies have been hesitant to adopt it. The pandemic necessitated a reimagining of employees' home environments to accommodate teleworking, exposing us to many (new) networking platforms and endorsing the AI strategy's mobile mobility ambitions. To boost online communication tools, AI can be used as an enhancing and translating technology. For example, it can identify background noises such as a vacuum cleaner and filter them out during a conversation using machine learning. The lowering of regulatory barriers is another trend that is

assisting AI's incorporation into Society. Many analog ways of working had to go digital to preserve social distance, boosting digital initiatives like telemedicine and remote education to be embraced. Because of the need to enable digital alternatives, AI embedded technology can improve connectivity, protection, and customer experiences[115].

To begin, let's look at what Japan is best known for autonomous robot growth. Mirai's newest invention can detect people with fever in public places such as malls or airports. The infected person is then isolated, and if possible, a teleconference with a doctor is started. Autonomous navigation, identification, and interaction are all possible thanks to AI technology. Fujitsu has implemented a COVID-19 countering program in the form of an AI hand washing monitor. It encourages workers in the healthcare, hotel, and food-service industries to obey the health ministry's six-step hand-washing protocol by detecting complicated hand gestures, including whether or not people use soap. Glory Ltd offers a remedy for our inconvenience whenever facial recognition software fails to recognise masked faces. Its technology can tell the difference between faces hidden behind masks. Tokyo's robot hotel, which accepts patients infected with the virus, provides a last glimpse into the Society 5.0 imagined future. This practical application of AI-enabled robots can support or even replace care workers in high-risk infection risk situations. All of these findings demonstrate that the pandemic is more than just a painful condition. The uncertainty has inspired new innovative ideas and realistic AI solutions to tackle this global challenge.

Artificial intelligence is bursting. AI has flourished due to the global digital revolution, and it is now being used to develop techniques in fields other than those for which it was planned. Japan and New Zealand both face unique challenges as a result of the world-changing

digital revolution. Similar issues, such as a skill shortage, the need to change laws, or being surrounded by countries evolving and even monopolising strategies, may be addressed together. Though we are not as well-known in the AI sector as the United States and China, we share similar values on which we can build a partnership. Accepting each other's flaws and confronting our social challenges together has promise. Topics such as our senior communities, agricultural innovations, and the recent COVID-19 pandemic provide opportunities to work together to find intelligent solutions.

Japan has taken a creative approach to envision the future Society, incorporating AI into virtually every aspect of the strategy. Whereas applications and apps appear to be the focus in Europe, robotic solutions appear to focus in Japan. We can see the first signs of Society 5.0 in Tokyo's local supermarkets, thanks to Japan's emphasis on robotisation and AI-controlled robots' public inclusion. Japan's strategy for combating COVID-19 at Narita Airport is to use AI-assisted robots once more. Another invention is robots greeting visitors, cleaning up after them, or immediately calling a doctor after detecting a high temperature. The pandemic has not yet begun, but it has certainly intensified the need for robot employment.

The Japanese government, the private sector, and, of course, their knowledge centers have collaborated to create a conducive domestic atmosphere to create new AI techniques. The Japanese government supports initiatives to bring realistic AI solutions to societal issues to market, invest in research facilities, and implement policies and legislation to make Society 5.0 a big AI stimulus, a reality. Japan is aggressively courting AI talent, establishing and subsidising university collaborations. New Zealand could benefit from this exchange of information and research opportunities. Dutch entrepreneurs can fill in the holes in the Japanese AI market. The private sector is an integral part of Japan's strategy because their R&D investments enable them

to stay on top of the latest developments. Japanese companies such as Mitsubishi, Toshiba, Toyota, and Hitachi are investing in artificial intelligence (AI) to develop their products with an eye on the European market[116].

The importance of using AI as a core technology in the Society above 5.0: a highly technologically oriented society in which social problems are solved by a framework that combines cyberspace and physical space has led to Japan's welcoming policies enabling an atmosphere in which AI technologies can flourish. AI has been designated as a core technology in many Japanese R&D programs to achieve this aim. The Japanese Moonshot initiative, close to Europe's Horison 2020, and the Command Prompt Promotion Program provide AI stimulus. SCAIT's AI plan sets out a blueprint on how and where AI should be used, with three tracks: efficiency, mobility, fitness, medical care, and welfare. These tracks are not just for the future; they've already been introduced. Japan is now in the second step of its policy, taking Society 5.0 closer to Japanese citizens' everyday lives. With these advancements, the digital future filled with AI-enhanced robots that were once only imagined in science fiction stories could become a possibility for the Japanese population as early as 2030.

Final Conclusion

The thesis fulfills the study's purpose to explore current leaders' expectations as the leadership position changes as AI is implemented at work. The idea will deepen AI's understanding of AI's impact on future leadership by addressing these hypotheses. Owing to COVID- 19, the limited-time spent completing the research and the difficulty of having a thorough knowledge of a knowledge field in one analysis also includes other research constraints. More time has been taken to reach a more extensive array of interviewers and case studies, allowing for a more accurate picture of how leaders interpret AI's impact on future leadership positions. Due to the time limitations, again due to COVID- 19, the distributed questionnaires had to be settled, particularly in Lund, which affected the results' generalisability.

With the current advancements in artificial intelligence and machine training, machine learning has seen exponential growth and development. Today's machines are still far removed from human intelligence but are more accurate, more precise, and more dynamically adaptable to external changes in the environment. Many enterprises automate their industrial processes on a massive scale because of the economic benefits of replacing human labour with automatons. Still, this pattern does not necessarily mean an end to human endeavor. Instead, the increasing automation of the current workplace requires many employees with innovative technological abilities. While manual jobs will have a dim future, knowledge-intensive and specialised jobs will present millions of future workers with a new career opportunity[117].

The benefits presented and the concerns posed by government predictive algorithms are essential to take into account. It is also necessary, however, not to try comparing them with

perfect decision-makers in human beings. People are subject to cognitive prejudice, logical errors, and a wide variety of biases and mistakes. We must also be aware that algorithms are not introduced into a perfect system in any way. Ethnicity, gender, and social class, together with the rest of the world, are highly predictive of health and longevity, jobs and economic safety, and legal relations, including prison probability. The nature of these various experiences is complex and disputed, but algorithmic decision-making has not introduced them de novo.

Nor is it an entirely new phenomenon to use predictive algorithms in the New Zealand governmental sector. Algorithms like RoC-RoI were used for decades, as we have shown. However, there is a range of issues and opportunities to increase these tools' use and their increasing strength and complexity. This includes potential large volumes of information that can contribute to decision-making, the opacity of decision-making, and the furnace of realism that can cover the outcome. We have tried to approach this subject from a neutral starting position: we do not accept or oppose using the algorithmic tools, but we want to explore how to maximise its benefits and at least reduce its risks.

In many ways, algorithms and varying degrees of intricacy and transparency are available. We suggested that the legislation/regulation/ethical analysis should sometimes focus on utilisation/potential harm instead of the exact form of technology because the latter method risks regulatory disconnection. However, for many regulatory/supervisory purposes, the general idea of a "predictive algorithm" applies and, in recent public discourse, covers a valuable subset of the "AI" algorithms.

"Fairness" could take multiple forms. All definitions may not be met at the same time. Government agencies should take into account the kind of fairness appropriate to contexts where

specific algorithms are used. The exclusion from test examples or input variables of protected features does not guarantee that the results are discriminatory or unfair. For example, other variables can act as proxies for specific components, and historical discrimination can nonetheless impress the input data, which appears to be harmless. It is essential to be aware of the error rates, but remember that not all errors are the same; some have an unreasonable impact on certain parts of the population. These will often be political or economically powerless sections. In New Zealand, Māori people are probably involved as well as vulnerable people.

To develop or obtain new predatory algorithms, federal agencies should implement or develop in-house processes. These should also apply if existing algorithms are proposed for a new purpose. These procedures should assess the effects on accuracy, accountability, privacy, and human rights of some considerations. The process developed by MSD could be an instructive example in this connection, although we know that further research on its use and efficiency is necessary. There is also likely to be a need for frameworks designed to respond to the particular concerns arising within their contexts by various agencies.

Internal processes should be thorough enough to alleviate concerns, but it can be difficult for employees to navigate such processes. Workload models should be provided for this and training in the use of such tools, where necessary. The government ought to consider setting up a regulatory/supervisory authority. This will work with government agencies that intend to either introduce a new predictive algorithm or use a unique predictive algorithm[118].

[118] Ibid

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